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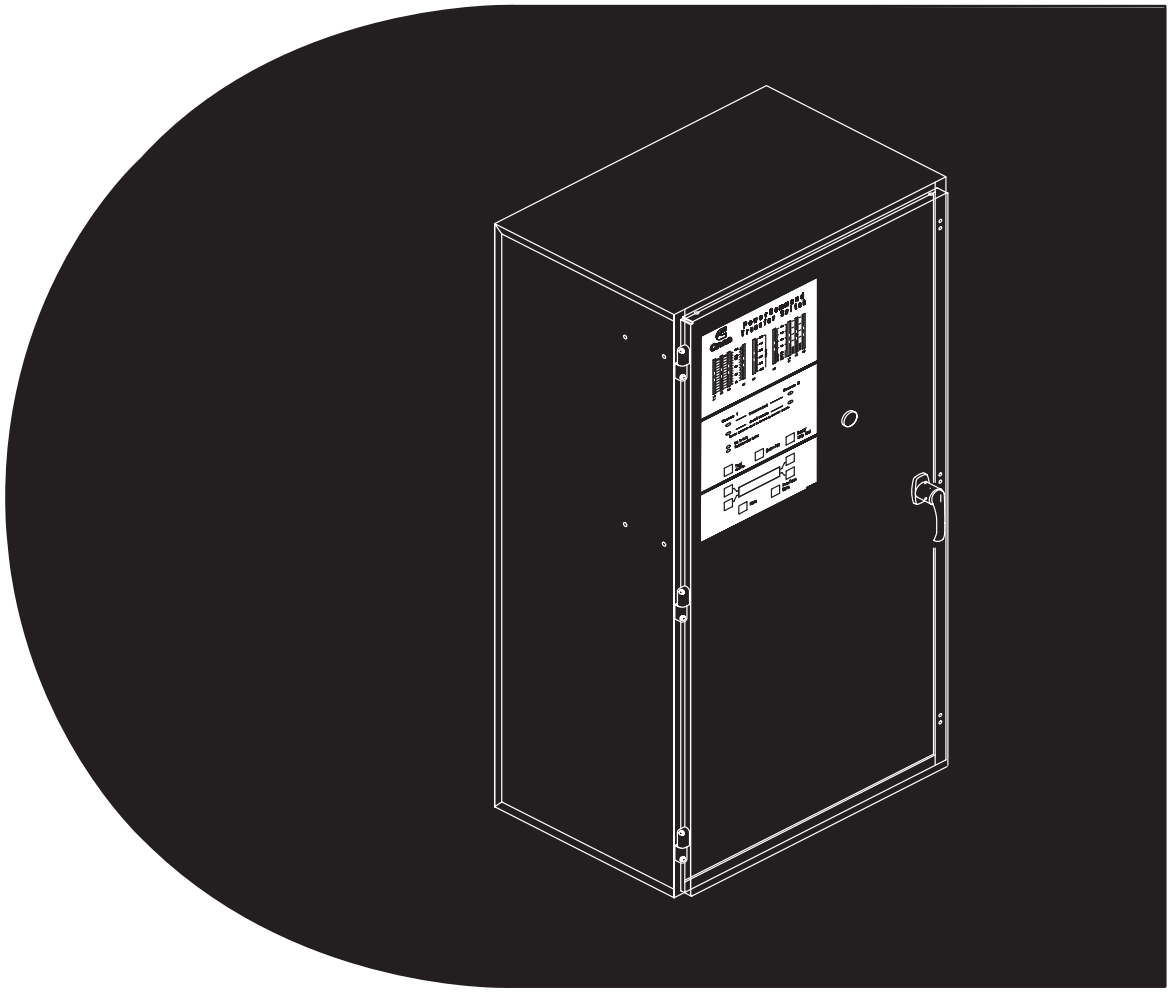
Power Generation

Installation Manual

OTPC
Transfer Switch
40 to 3000 Amperes



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962–0612A 10-2002

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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

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.

UTILITY-TO-GENSET OR GENSET 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.

UTILITY-TO-UTILITY APPLICATIONS

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

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 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

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

1. 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 OTPC transfer switch. This is an open transition (OT) transfer switch with PowerCommand (PC) Control.

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 1-1). 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.

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 LonMark™ devices.

- Genset
- Master Controller
- Annunciator Panel
- Circuit Breaker

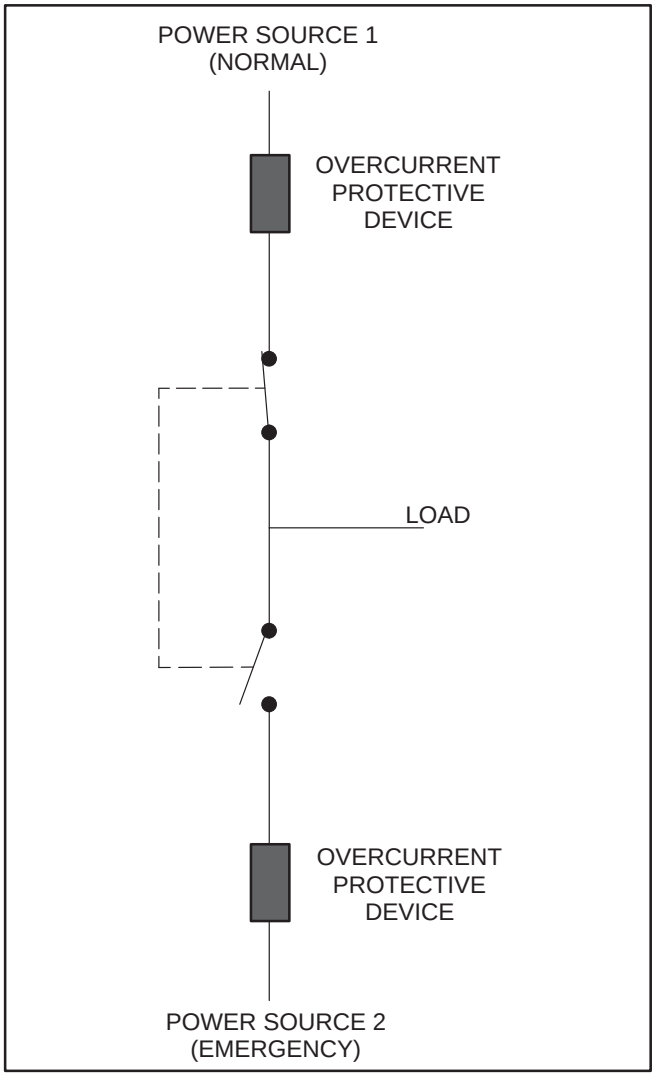

FIGURE 1-1. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

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

UTILITY-TO-UTILITY OPERATION

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

1. Senses the interruption of the Source 1 power.
2. Transfers the load to the Source 2.
3. Senses the return of Source 1.
4. Retransfers the load to Source 1.

Level 2 controllers can control a two-utility configuration for prime power. One utility is designated the preferred source. The control automatically transfers the load between the two utilities and detects alarm conditions. The exercise routine is not available in this configuration.

The operator can select either source as the preferred source. See the Digital Display Menu System section.

GENERATOR-TO-GENERATOR CONTROL

The genset-to-genset control can be set up for two types of applications:

- Prime Power – Two gensets provide all of the power (utility power is not available)
- Dual Standby – Two gensets are used to back up utility power

Note: The Test/Exercise function and Load Shed feature are not available in this configuration.

If one genset fails to operate within the specified range of voltage and frequency, the transfer switch automatically starts and connects the other genset.

Preferred Source Selection

With both prime power and dual standby applications, either genset can be set up to be the preferred source. If the preferred source is changed while one of the gensets is running, the control starts the second genset and transfers the load to it, when it becomes available.

Time Delays

All the time delays are factory set and are adjustable through the front panel display. The factory settings are:

TDNE	10 SEC
TDEN	600 SEC
TDESa	3 SEC
TDECa	600 SEC
TDESb	3 SEC
TDECb	600 SEC

Note: TDESa and TDECa are for the Source 2 genset and TDESb and TDECb are for the Source 1 genset.

Use the Time Delay sub-menus under Setup or the PC Service tool to change the settings.

Prime Power (Plant to Plant) Operation

In prime power applications, utility power is not available. The system includes one transfer switch and two gensets. One genset is always running and supplying power to the load while the other genset is the backup genset. An external power supply is not needed in this application.

Preferred Source Selection – Under normal operation, one genset is designated as the preferred source and supplies power to the load. The second genset is the backup power source. If the preferred genset fails, the backup genset starts and the transfer switch transfers the load to the backup genset.

At any time, the PC Service tool or the Test submenu can be used to designate either genset (Source 1 or Source 2) as the preferred genset. If the preferred genset is changed and the backup genset becomes the preferred genset, the transfer switch transfers the load to the new preferred genset when it becomes available. The unit that is carrying the load is always considered the preferred source.

Automatic Changeover – The transfer switch can be set up to change the preferred source automatically by enabling the changeover timer. The Time Delay sub-menus under Setup or the PC Service tool can be used to enable the changeover timer and specify a changeover delay time period.

The automatic changeover timer automatically changes the preferred source and transfers the load to the new preferred genset after a TDEN time delay. After the transfer is complete, the control initiates a cool-down period (TDEC) on the old preferred genset before shutting it down. The old preferred genset is now the new backup genset. The changeover timer is now timing for the next changeover and the cycle continues as long as the changeover timer is enabled.

Prime Power Wiring – A permanent start jumper is installed in the transfer switch and is shipped from the factory in the prime power mode. Verify that the jumper (TB3-57 to TB3-59) is installed (see interconnect drawing 630–2108 in Chapter 7).

System Startup – To set up a system for prime power operation:

1. Place the motor disconnect switch in the Off position, and both generator selector switches into the OFF position.

2. Place the transfer switch in the Source 1 position.

3. Place the Off–Manual–Auto selector switch on the Source 1 genset control in the Auto position. The genset will start and supply power to the load (the load will be energized and TDECa may be timing).

4. Use the PC Service tool or the Test sub-menu to set this genset as the preferred source.

5. Wait for TDECa to finish timing.

6. Place the Off–Manual–Auto selector switch on the backup genset (Source 2) control in the Auto position.

7. Place the motor disconnect switch in the Auto position.

8. If desired, use the Time Delay sub-menus under Setup or use the PC Service tool to enable the changeover timer and specify a changeover delay time period.

Testing the System by Turning Off the Preferred Source:

1. With the preferred source genset running and supplying power to the load, place the genset control Off–Manual–Auto selector switch in the Off position. The backup genset should start and run.

   After the voltage and frequency are at acceptable levels, the transfer switch should transfer the load to the backup genset.

2. Place the genset control Off–Manual–Auto selector switch on the preferred genset back in the Auto position. The preferred genset should start and run.

   After the voltage and frequency levels are at acceptable levels, the transfer switch should transfer the load back to the preferred genset.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the backup genset and it should stop.

Testing the System by Changing the Designated Preferred Source:

1. With the preferred source genset running and supplying power to the load, use the PC Service tool or the Test sub-menu to change the preferred source. The new preferred source should start and run.

   After the voltage and frequency are at acceptable levels, the transfer switch should transfer the load to the new preferred source.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the old preferred source and it should stop.

2. Use the PC Service tool or the Test sub-menu to change the preferred source back to the original genset. The original genset should start and run.

   After the voltage and frequency levels are at acceptable levels, the transfer switch should transfer the load back to the original genset.

   After the transfer is complete, the control initiates a cool-down period (TDEC) on the backup genset and it should stop.

Dual Stand-By Operation

In dual stand-by applications, utility power is available. The system includes two transfer switches and two gensets. Utility power supplies power to the load and both gensets are backup gensets.

Under normal operation, the utility is supplying power to the load through the lead transfer switch. The lead transfer switch is a utility-to-genset switch. The two gensets are connected to the genset-to-genset transfer switch. The load side of this switch is connected to the genset side of the lead transfer switch.

Upon loss of utility power to the lead transfer switch, a signal is sent to the genset-to-genset transfer switch to start the preferred genset. When the lead transfer switch senses generator voltage, it transfers the load to that genset. If the preferred genset fails to start, a signal is sent to the backup genset to start. The PC Service tool or the Test sub-menu on the genset-to-genset transfer switch can be used to set the preferred source.

If the Stand-By Start is inactive, upon initial power–up (or reset), or during software initialization, the transfer switch control will not start either genset. When a Stand-By Start command is received from a Master ATS (or other device), the preferred genset immediately starts. If the preferred genset does not start, a time delay engine start (TDES) is initiated and the control starts the backup genset. The load is connected to the genset when it becomes available.

If the preferred genset becomes available while the backup genset is active, a time delay retransfer (TDEN) period is initiated and the load is retransferred back to the preferred genset. A time delay cool-down (TDEC) period is initiated before turning off the backup genset. When the Stand-By Start becomes deactivated, a TDEC period is initiated and the active generator is turned off.

Preferred Source Selection – Under normal operation, one genset is designated as the preferred source and the second genset is designated as the backup power source. If the both the utility power and the preferred genset fails, the backup genset starts and the genset-to-genset transfer switch transfers the load to the backup genset.

At any time, the PC Service tool or the Test sub–menu on the genset-to-genset transfer switch can be used to designate either genset (Source 1 or Source 2) as the preferred genset. If the preferred genset is changed and the backup genset becomes the preferred genset, the transfer switch transfers the load to the new preferred genset if it is needed and when it becomes available.

Alternating Preferred Source – In an attempt to keep the running time equally distributed between both gensets, the control can be set to alternate between the gensets when utility power fails. The selected preferred genset starts with the first power outage. The second power outage starts the backup genset, which now becomes the preferred genset. Upon subsequent outages, the preferred genset alternates.

Only utility outages and tests or exercises initiated at the lead transfer switch result in the gensets being alternated. The designated preferred genset will not change if it fails and the backup genset takes over the load. This alternating preferred source can only be enabled with the PC Service tool. When enabled, a genset can be designated as the preferred source for a maximum of two weeks. Time adjustments can be made in one-hour increments.

Control Voltage – A dual stand-by configuration requires an external 12–24 VDC power supply to keep the genset-to-genset control active. An optional Battery Kit is available, or the genset starting batteries can be used. See drawing 630–2024 for connection details.

Dual Stand-By Wiring – For dual stand-by applications, the jumper (TB3-57 to TB3-59) must be removed (see interconnect drawing 630–2024 in Chapter 7).

System Startup – To set up a system for dual stand-by operation:

1. Place the motor disconnect switch on both transfer switches in the Off position.
2. Connect both transfer switches to the Source 1 side.
3. Make sure the Off–Manual–Auto selector switch on both gensets is in the Off position.
4. Make sure the genset-to-genset transfer switch is being powered by an external DC supply.

5. Press the Lamp Test/Reset button on the genset-to-genset transfer switch. If all of the front panel lights come on, the control is running properly.
6. Use the PC Service tool or the Test sub-menu on the genset-to-genset transfer switch to set the Source 1 genset as the preferred source.
7. Energize utility power to the lead transfer switch. The load is energized and a time delay (TDECa) begins.
8. Wait for TDECa to finish timing.
9. Set the time delay engine start (TDESa) to zero on the lead transfer switch.
10. Set the time delay engine stop (TDECa) to zero on the lead transfer switch.
11. If desired, use the PC Service tool to enable the alternating preferred source.
12. Place the motor disconnect switch in the Auto position on both transfer switches.

Testing the System by Removing Utility Power and Turning Off the Preferred Genset:

1. With the utility supplying power to the load and neither genset running, turn off the utility circuit breaker feeding the load transfer switch. The preferred genset should start and run.

   After the voltage and frequency are at acceptable levels, the lead transfer switch should transfer the load to the preferred genset.
2. Place the Off–Manual–Auto selector of the preferred genset (running) control in the Off position.

   The preferred genset should stop and the backup genset should start and run.

   After the voltage and frequency are at acceptable levels, the genset-to-genset transfer switch should transfer the load to the backup genset.
3. Place the Off–Manual–Auto selector switch on the preferred genset back to the Auto position. The preferred genset should start and run.

   After the voltage and frequency are at acceptable levels, the genset-to-genset transfer switch should transfer the load to the preferred genset. The backup genset should stop after the time delay engine cool-down (TDECa) is completed.
4. Turn on the utility circuit breaker feeding the lead transfer switch.

   After the voltage and frequency are at acceptable levels, the lead transfer switch should transfer the load back to the utility. The preferred genset should stop after the time delay engine cool-down (TDECb) is completed.

Testing the System with Alternating Preferred Source Enabled:

1. With the utility supplying power to the load and neither genset running, turn off the utility circuit breaker feeding the lead transfer switch. The preferred genset should start and run.

   After the voltage and frequency are at acceptable levels, the lead transfer switch should transfer the load to the preferred genset.
2. Restore utility power.

   After the voltage and frequency are at acceptable levels, the lead transfer switch should transfer the load back to the utility. The preferred genset should stop after the time delay engine cool-down is completed.
3. Turn off utility power. The backup genset should now be the preferred genset and should start and run.

   After the voltage and frequency are at acceptable levels, the genset-to-genset transfer switch should transfer to the new primary genset.

   After the lead transfer switch senses the proper voltage and frequency levels, the lead transfer switch should transfer the load to the genset.
4. Restore utility power.

   After the voltage and frequency are at acceptable levels, the lead transfer switch should transfer the load back to the utility. The new preferred genset should stop after the time delay engine cool-down is completed.

   The gensets will alternately start upon subsequent power outages, system tests, or exercises initiated by the lead transfer switch.

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
Genset-to-Utility	X	X
Genset-to-Genset		X
Utility-to-Utility		X

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, and 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 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.

OTPCA 00000 Spec.A
1 2 3 4

1. OTPC – Open Transition PowerCommand® Control.

2. Ampere Rating:
   A = 40, 70, 125
   B = 150, 225, 260
   C = 300, 400, 600
   D = 800, 1000
   E = 1200
   F = 1600
   G = 2000
   H = 3000

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 1-763-574-8087.

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

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2. Mounting

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.

There must be a service disconnect in the commercial power line ahead of the transfer switch.

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. Check the location to be sure that no wires, or plumbing, gas, or exhaust lines run behind the wall.
2. Install two mounting bolts in the wall for the top cabinet mounting keyholes.
3. With the shipping box standing so the cabinet is upright, carefully remove the top and sides of the box.
4. Raise the cabinet and mount it on the two mounting bolts in the wall.

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

5. Install two bottom mounting bolts, but do not tighten. (Do not remove the cabinet support until all bolts are installed.)
6. Push the cabinet against the wall. If the cabinet does not align flush against the wall, shim the mounting bosses as required.
7. Tighten all mounting bolts.

TABLE 2-1. APPROXIMATE NEMA 1 CABINET DIMENSIONS

Switch Current Rating	Height	Width	Depth With Door		Weight
			Closed	Open	
40,70, & 125	27 in 686 mm	20.5 in 521 mm	12 in 305 mm	31.5 800 mm	82 lb 37 kg
150 & 225	35.5 in 902 mm	26 in 660 mm	16 in 406 mm	41 in 1042 mm	165 lb 75 kg
260	43.5 in 1105 mm	28.5 in 724 mm	16 in 406 mm	43 in 1093 mm	170 lb 77 kg
300, 400, & 600	54 in 1372 mm	25.5 in 648 mm	18 in 457 mm	42 in 1067mm	225 lb 102 kg
800 & 1000	68 in 1727 mm	30 in 762 mm	19.5 in 495 mm	48.5 in 1232 mm	360 lb 163 kg
1200	75.0 in 1905 mm	36.0 in 915 mm	21.5 in 546mm	54 in 1372 mm	625 lb 283 kg
1600 & 2000	90.0 in 2286 mm	36.0 in 915 mm	48 in 1219 mm	84 in 2134 mm	1100 lb 499 kg
3000	90.0 in 2286 mm	36.0 in 915 mm	48 in 1219 mm	84 in 2134 mm	1250 lb 567 kg

TABLE 2-2. APPROXIMATE NEMA 3R AND 4 CABINET DIMENSIONS

Switch Current Rating	Height	Width	Depth with Door		Weight
			Closed	Open	
40, 70, & 125	34 in 864 mm	26.5 in 673 mm	12.5 in 318 mm	36.5 in 927 mm	125 lb 57 kg
150 & 225	42.5 in 1080 mm	30.5 in 775 mm	16 in 406 mm	44 in 1118 mm	215 lb 97 kg
260	46 in 1168 mm	32 in 813 mm	16 in 406 mm	46 in 1168 mm	225 lb 102 kg
300, 400, & 600	59 in 1499 mm	27.5 in 699 mm	16.5 in 419 mm	41.5 in 1054 mm	275 lb 125 kg
800 & 1000	73.5 in 1867 mm	32.5 in 826 mm	19.5 in 495 mm	49.5 in 1257 mm	410 lb 186 kg
1200	75 in 1905 mm	36.0 in 915 mm	19.5 in 495mm	55 in 1397 mm	450 lb 204 kg
1600 & 2000	90 in 2286 mm	32.5 in 826 mm	51.0 in 1295 mm	79 in 2007 mm	1100 lb 499 kg
3000	90 in 2286 mm	38.0 965 mm	51.0 in 1296 mm	84.5 in 2146 mm	1250 lb 567 kg

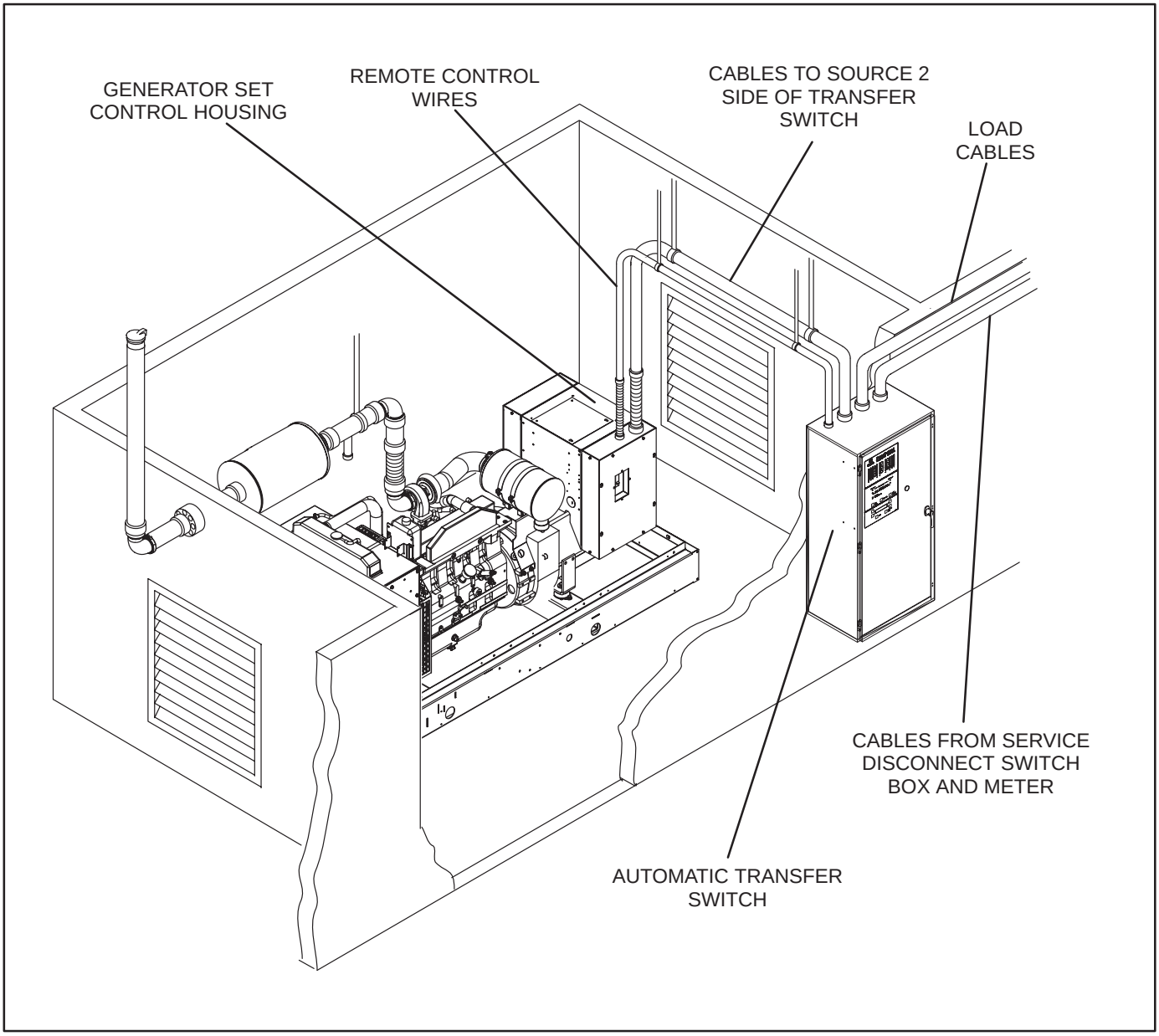


FIGURE 2-1. TYPICAL WALL-MOUNT INSTALLATION

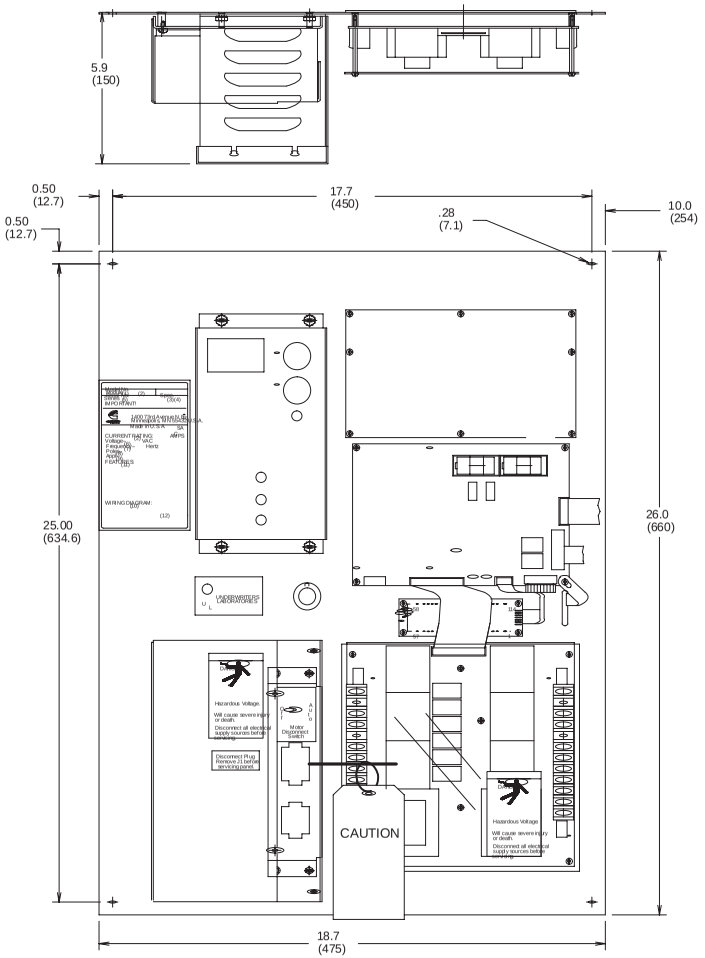
OPEN CONSTRUCTION

Use a cabinet of the required NEMA type. The door should be secured and have safety warnings required to meet all applicable codes. The minimum cabinet size is determined by the current rating of the transfer switch. Refer to individual outline drawings for the minimum cabinet dimensions.

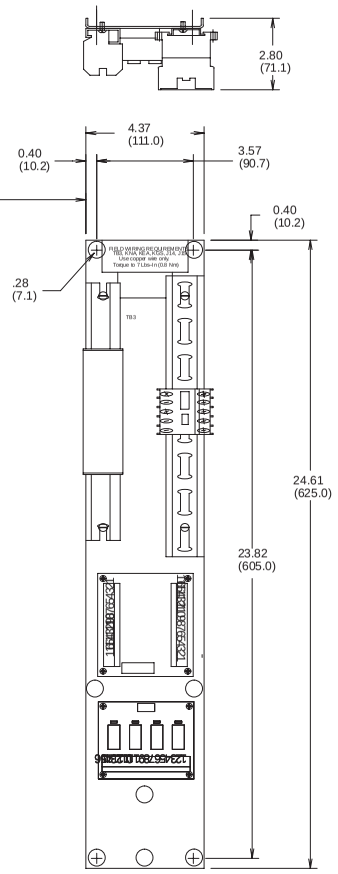
The outline drawings supplied with the transfer switch provide outline dimensions for mounting the transfer switch components inside the cabinet. Page one of the outline drawing shows hole patterns that must be drilled in the cabinet door to align various control components. Figure 2-2 shows page one of a typical outline drawing.

The touch panel has an adhesive back used to secure it to the front of the cabinet door. The ribbon cable routes through the top center hole of the hole pattern (Figure 2-2). Make sure the ribbon cable is protected from sharp edges and the routing hole does not cut or chafe the ribbon cable.

Refer to the Wiring Section for electrical connections.



STANDARD PANEL
(ALWAYS SUPPLIED)



OPTIONS PANEL

SUPPLIED WITH THE FOLLOWING OPTIONS: NETWORK COMMUNICATIONS, AUXILIARY RELAYS, LOAD MONITOR, RELAY MODULE, TERMINAL BLOCK, LOAD SHED AND BATTERY CHARGER ALARMS.

NOTE:

1. NEC TABLE (A) 373–6 SHALL APPLY WHEN THE CONDUCTOR DOES NOT ENTER OR LEAVE THE ENCLOSURE THROUGH THE WALL OPPOSITE ITS TERMINAL.

   NEC TABLE (B) 373–6 SHALL APPLY WHEN THE CONDUCTOR ENTERS OR LEAVES THE ENCLOSURE THROUGH THE WALL OPPOSITE ITS TERMINALS.

2. DIMENSIONS IN () ARE MILLIMETERS.

3. HARNESS BETWEEN TRANSFER SWITCH AND CONTROL PLATE CAN BE EXTENDED IN 4 FOOT INCREMENTS BY USING 338–2919 AND 338–2220. MULTIPLE HARNESSES CAN BE CONNECTED TOGETHER TO EXTEND DISTANCE.

4. APPROX CONTROL PANEL WEIGHT: 48 LBS
   MASS: 21.8 kgs

MINIMUM CABINET DIMENSIONS	
AMPS	ENCLOSURE IN INCHES
40–125	20–1/4 WDT X 27 HGT X 12–1/16 DP
150–225	25–5/8 WDT X 35–1/2 HGT X 15–13/16 DP
260	28–5/32 WDT X 40–17/32 HGT X 15–13/16 DP
300–400	25–5/32 WDT X 53–13/16 HGT X 16–1/8 DP
600	25–5/32 WDT X 53–13/16 HGT X 16–1/8 DP
800–1000	30 WDT X 67–5/8 HGT X 19–1/8 DP

WIRE BENDING SPACE (1)		
AMPS	TABLE A	TABLE B
40–125	3–1/2	6
150–225	5	7
260	6	10
300–400	8	15
600	8	14
800	10	15
1000	12	16

40 THRU 1000 AMP
3 AND 4 POLE, FRONT CONNECT

FIGURE 2-2. TYPICAL OPEN CONSTRUCTION FOR 40-1000 AMP TRANSFER SWITCHES

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3. Wiring

Refer to Figures 4-1 and 4-2 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 to prevent accidental entry of metal chips.

2. If using rigid conduit between the generator set and the transfer switch, install at least 2 feet (610 mm) of flexible conduit between the rigid conduit and generator set to absorb vibration.

3. Run control circuit wiring in separate conduit from the AC wiring; otherwise, induced currents could cause operational problems within the switch. 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.***

DUAL STANDBY SYSTEM – GENSET-TO-GENSET INSTALLATIONS

Genset-to-genset installations that include a dual standby system are typically installed with a control battery and battery charger. Refer to the interconnection drawings included with your transfer switch. A typical interconnection drawing for this type of installation is included at the back of this manual.

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.

   Table 3-1 gives the type and maximum conductor size the transfer switch accepts. Figures 3-3, 3-4, and 3-5 show transfer switch source and load connections.

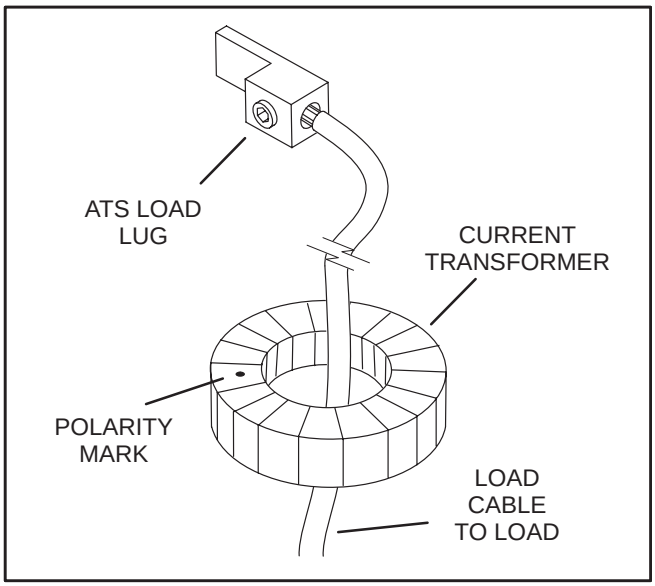

FIGURE 3-1. CURRENT TRANSFORMER WIRING

TABLE 3-1. TERMINAL LUG CAPACITY FOR COPPER OR ALUMINUM CONDUCTORS

Switch Current Rating	Wires per Phase	Size Range of Wires
40/70/125 Source	1	12 AWG-2/0 Cu-Al
40/70/125 Load & Neutral	1	14 AWG-2/0 Cu-Al
150/225	1	6 AWG-300 MCM Cu-Al
260	1	6 AWG-400 MCM Cu-Al
300/400	2 1	3/0 AWG-250 MCM Cu-Al 3/0 AWG-600 MCM Cu-Al
600	2	250-500 MCM Cu-Al
800/1000	4	250-500 MCM Cu-Al
1200	4	2 AWG-600 MCM Cu-Al
1600/2000	8	2 AWG-600 MCM Cu-Al (lugs optional)
3000	8	2 AWG-600 MCM Cu-Al (lugs optional)

4. 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.

5. Connect power cables to the load terminals. Tighten the lugs as indicated in Table 3-2.

TABLE 3-2. LUG TORQUES

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

6. Make sure that both AC power sources are disconnected.

   ⚠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.***

7. For 800–1000 amp transfer switches used on a circuit capable of delivering 50,000 amps @ 600 volts, wrap the line cables together with nominal 1/2-inch nylon rope, or rope having a minimum tensile strength of 4200 pounds, at five inches from the line terminals with four wraps (see Figure 3-2).

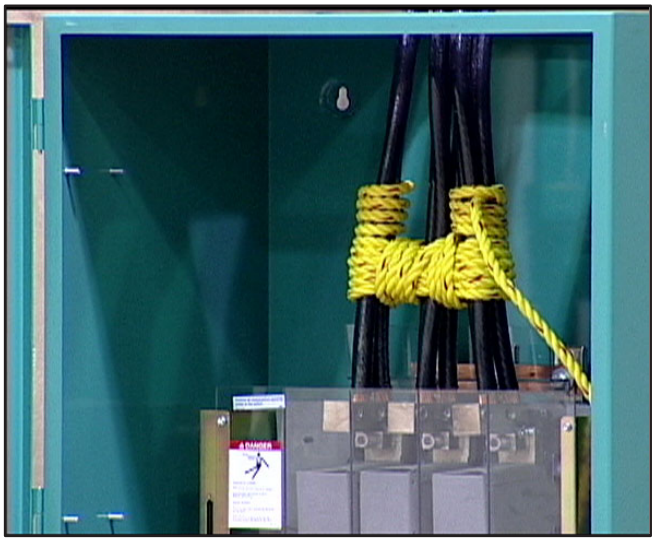

FIGURE 3-2. SECURING THE POWER CABLES

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 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.***

1. 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.***

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.***

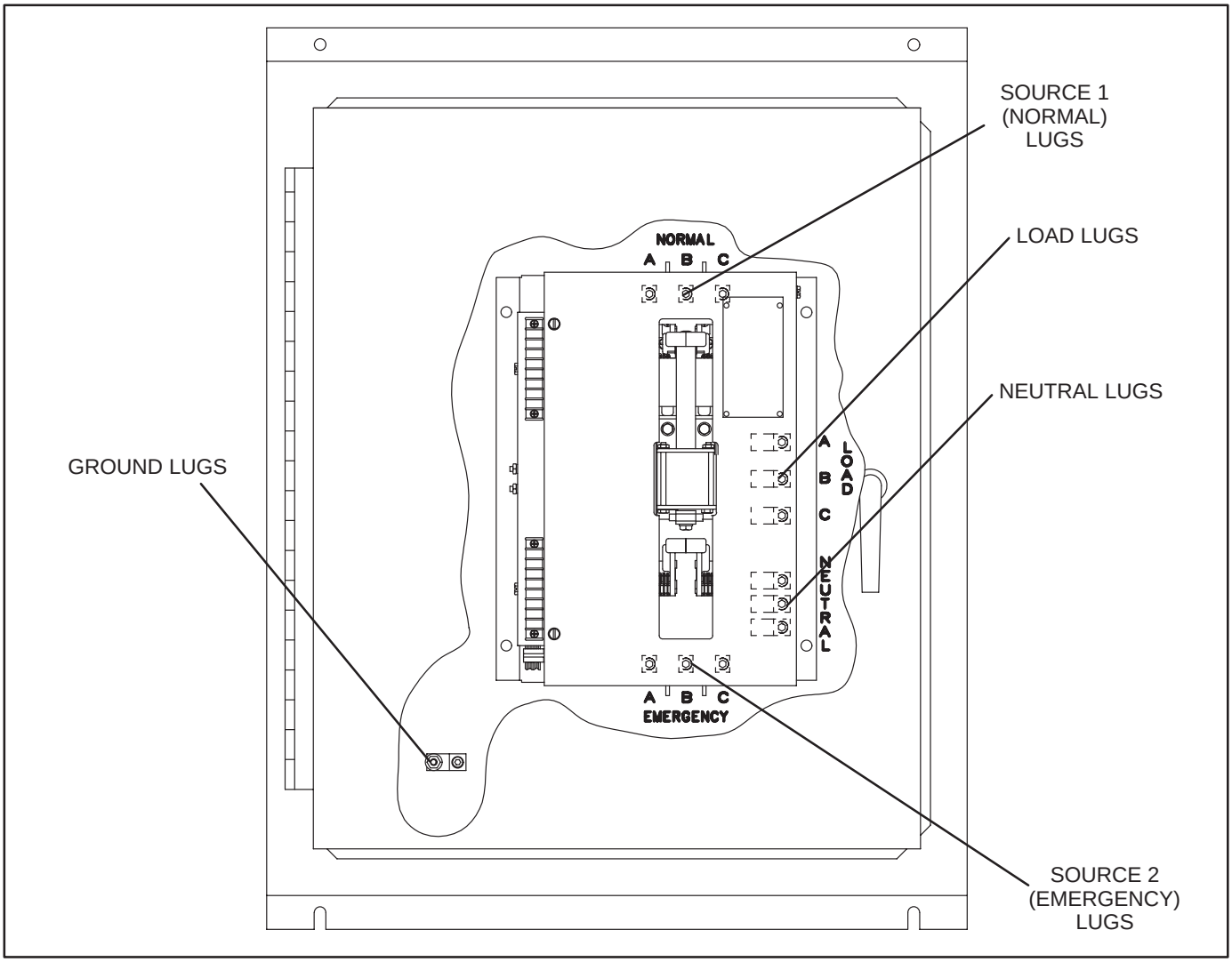

FIGURE 3-3. 40- TO 125-AMPERE TRANSFER SWITCH TERMINAL ACCESS

3. 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.

4. Set the appropriate Phase parameter with the digital menu system (see Section 4) when it is available or the PC service tool.

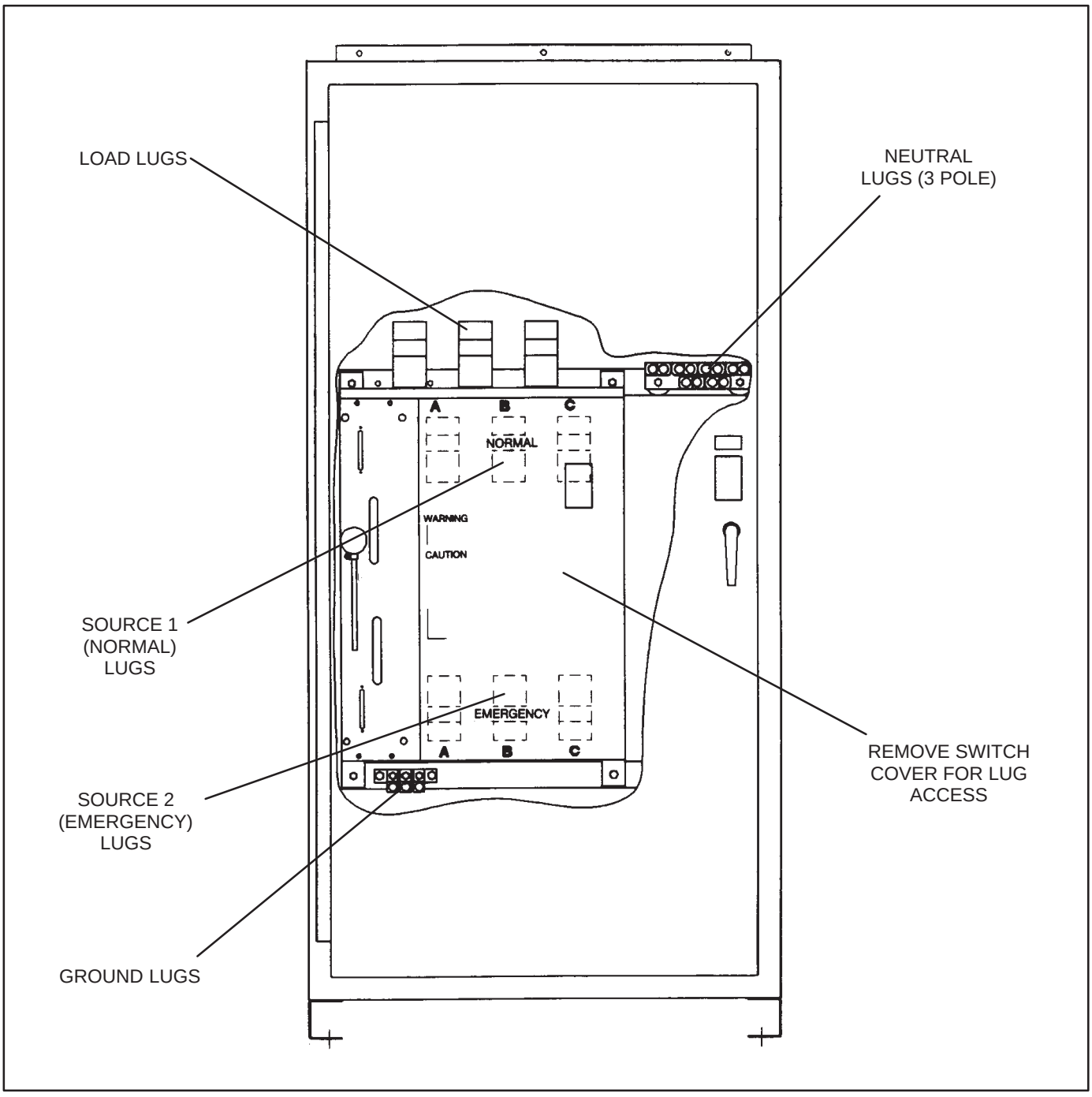

FIGURE 3-4. 1200-AMPERE TRANSFER SWITCH TERMINAL LUG ACCESS

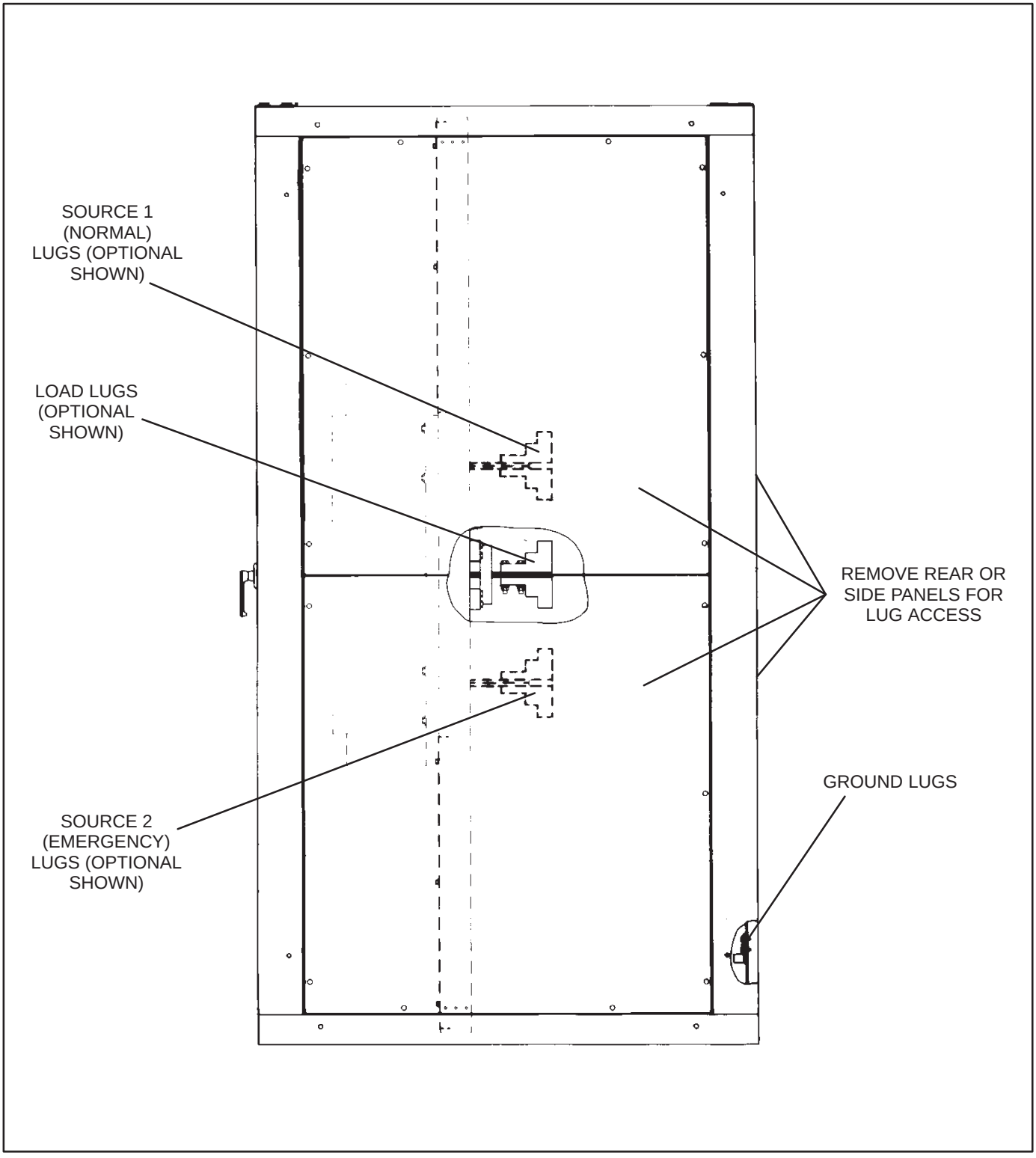

FIGURE 3-5. 1600- TO 3000-AMPERE TRANSFER SWITCH TERMINAL LUG ACCESS

CONTROL CONNECTIONS

Connections of standard and optional control wiring are made at terminal blocks TB1, TB2, TB3, and Relay Module; and directly at the (optional) auxiliary relays (Figure 3-6).

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 (see Table 3-3).

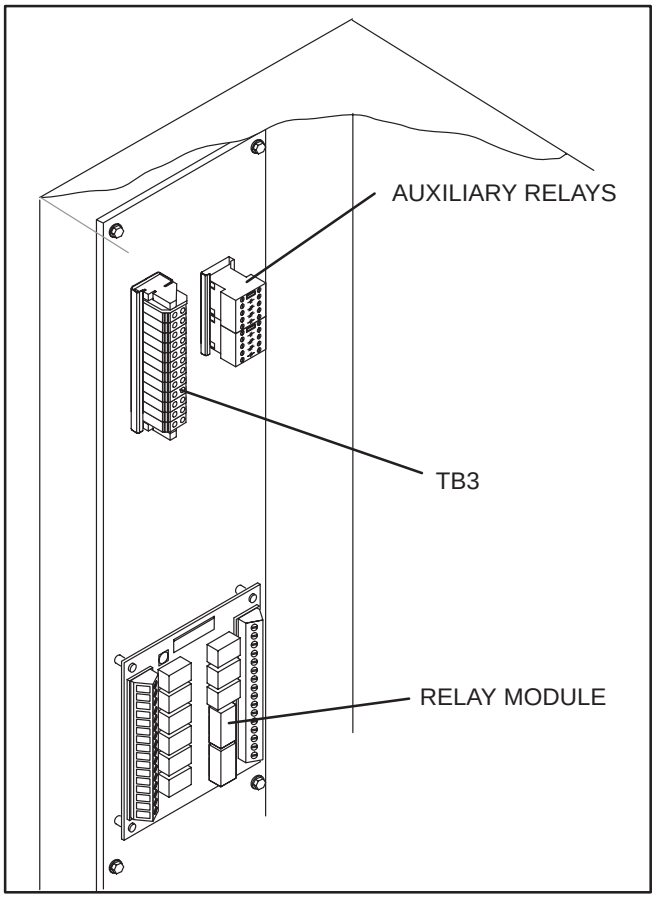

FIGURE 3-6. CONTROL WIRING CONNECTIONS

TABLE 3-3. DIN RAIL LOCATIONS

Model (Amps)	Cabinet Type	Location
OTPC 40–1000 A	All Types	Inside, upper left wall
OTPC 1200 Amps	All Types	Upper left side
OTPC 1600–3000 A	Type 1	Left side of cabinet
OTPC 1600–3000 A	Type 3R, 4, 12	Right side of cabinet

Connecting Transfer Switch to Genset

⚠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 3-4 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, use Column B for B+ and GND. Use Column A for all other wires.
- If the transfer switch is equipped with a 10-Amp charger, use Column C for B+ and GND. Use Column A for all other wires.
- If the genset is equipped with an annunciator, use Column A for wires to the annunciator.

TABLE 3-4. WIRE SPECIFICATIONS

Wire Size (AWG)	Distance in Feet, One Way (Multiply by 0.3 for Meters)		
	Column A	Column B	Column C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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 3-8). 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 genset controls, install a jumper between TB2-1 and TB2-2 for ground-to-start connection.
- For Detector 12 genset controls, install a jumper between TB2-2 and TB21–3 for B+ start.

- For PCC-3200 genset 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, 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 3-7). The contacts have ratings of 10 amperes at 250 VAC. Figure 3-7 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.

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

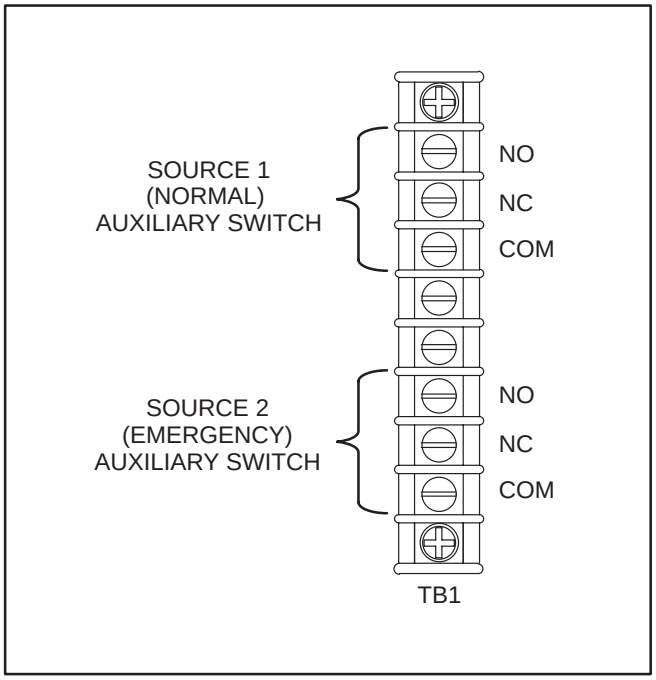

FIGURE 3-7. TERMINAL BLOCK TB1

Remote Start-Stop Connections

Use number 18 to number 12 AWG 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 Onan water-cooled generator sets only) uses terminals B+, GND (ground), and RMT of terminal block TB2 (Figure 3-8). 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.

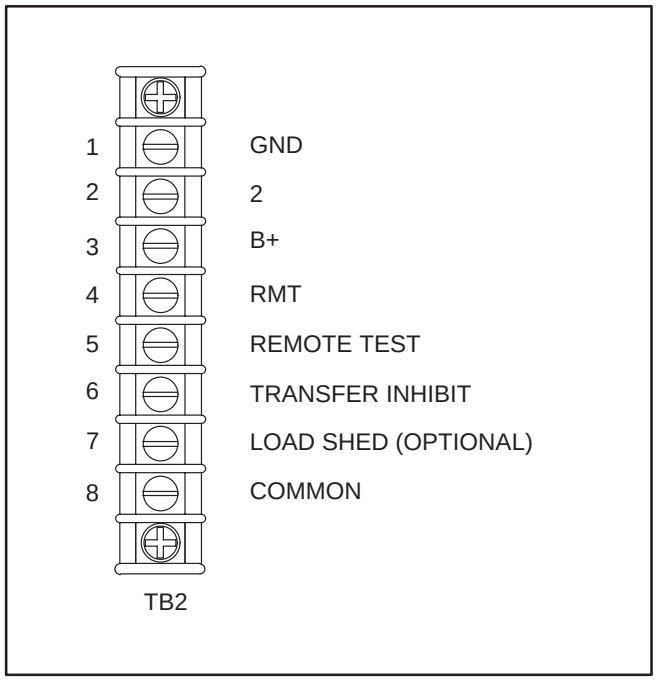

FIGURE 3-8. TB2: START CONNECTIONS, REMOTE TEST, AND TRANSFER INHIBIT

Remote Test Switch

The transfer switch can be wired with a remote test transfer switch. Closure of a set of contacts 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.)

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

Use number 22 to number 12 AWG 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 3-8).

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

Load Shed Option

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

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 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 3-6 shows the location of the Auxiliary Relays on the options panel. The terminals accept wire sizes from one number 18 AWG wire to two number 12 AWG 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 3-5 lists several auxiliary relay options.

All relays have two normally open and two normally closed contacts that are rated for 6 amperes at 600 VAC (Figure 3-9).

TABLE 3-5. AUXILIARY RELAY

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

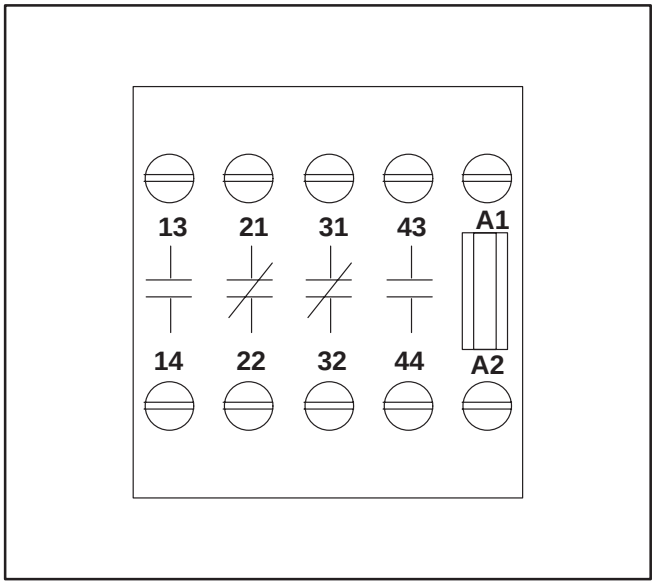

FIGURE 3-9. AUXILIARY RELAY TERMINALS

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 3-6 for location in the enclosure and Figure 3-10 for details. See Table 3-6 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 wire. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

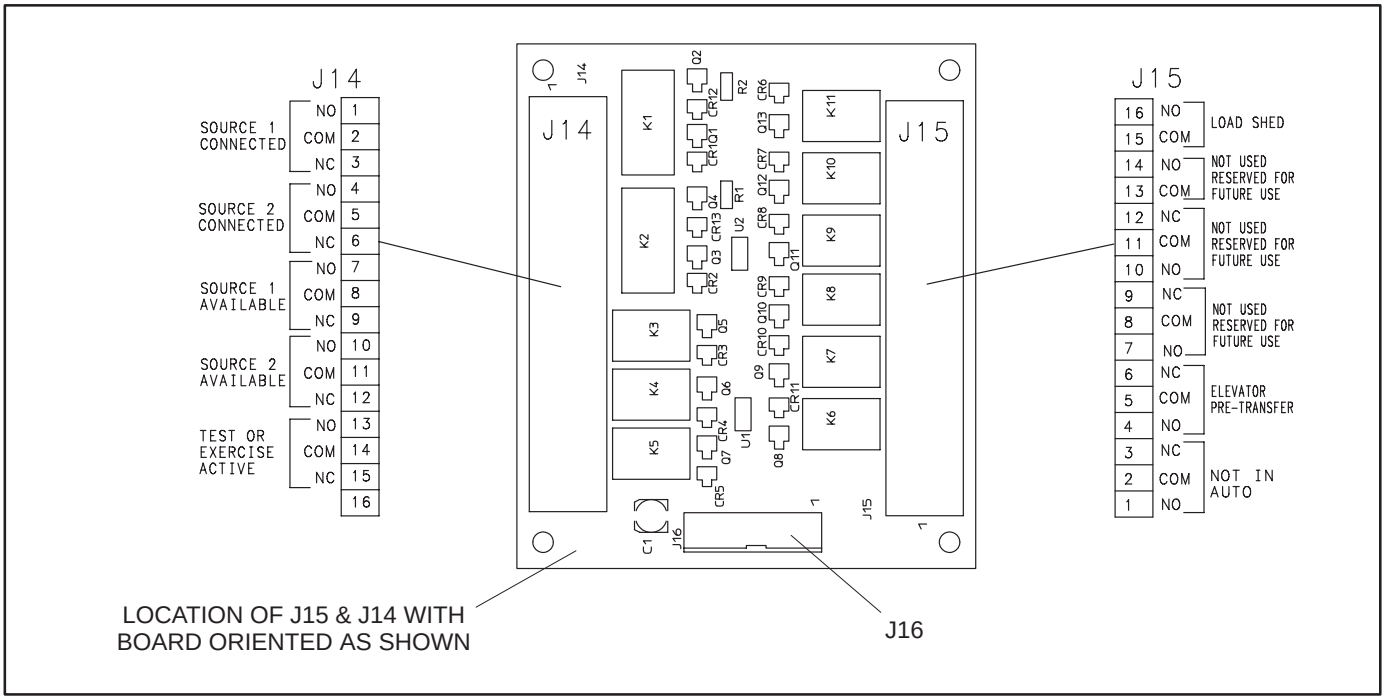

FIGURE 3-10. OPTIONAL RELAY MODULE

TABLE 3-6. 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

Battery Charger Alarm Contacts Option

The optional 10-ampere battery charger can include three sets of form C relay contacts, as an additional option.

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.

The contacts are rated for 4 amperes at 120 VAC or 30 VDC. Connections to these contacts are made at terminals 41-42-43 (AC failure), 44-45-46 (high battery voltage), and 47-48-49 (low battery voltage) of TB3 (Figure 3-11). See Figure 3-6 for the location of TB3 on the option panel.

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

The Level 1 and Level 2 Digital Modules have an input dedicated to monitor the AC Line failure on the battery charger. This input is located at J27-23 and activated when grounded. (As of this printing, this input is only available at J27-23.)

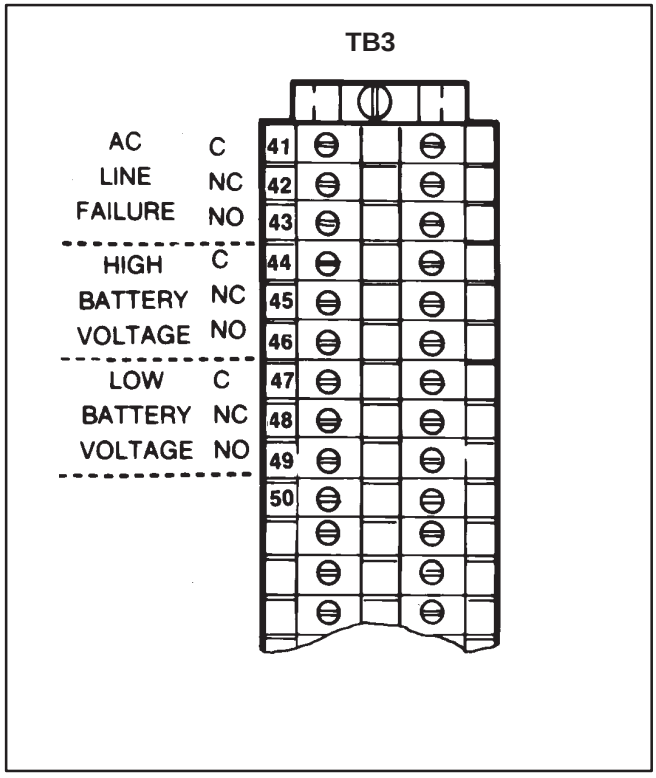

FIGURE 3-11. BATTERY CHARGER ALARM CONTACTS

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 3-12).

   NOTE: Leave the short jumpers as they are.

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

TRANSFER SWITCHES IN FIRE PUMP CIRCUIT APPLICATIONS

Figure 3-13 shows the typical fire pump controller/ transfer switch arrangement for transfer switches in the range of 40 to 1000 Amp.

Required Transfer Switch Features

1. An OTPC with Level 2 control (One ATS per fire pump)
2. Programmed Transition module
3. Phase Sequence monitor
4. Momentary Test Switch (on cabinet door)
5. UL Type 4 or 12 cabinet

Location

The transfer switch and Source 2 (generator) isolating switch must be located in the fire pump room.

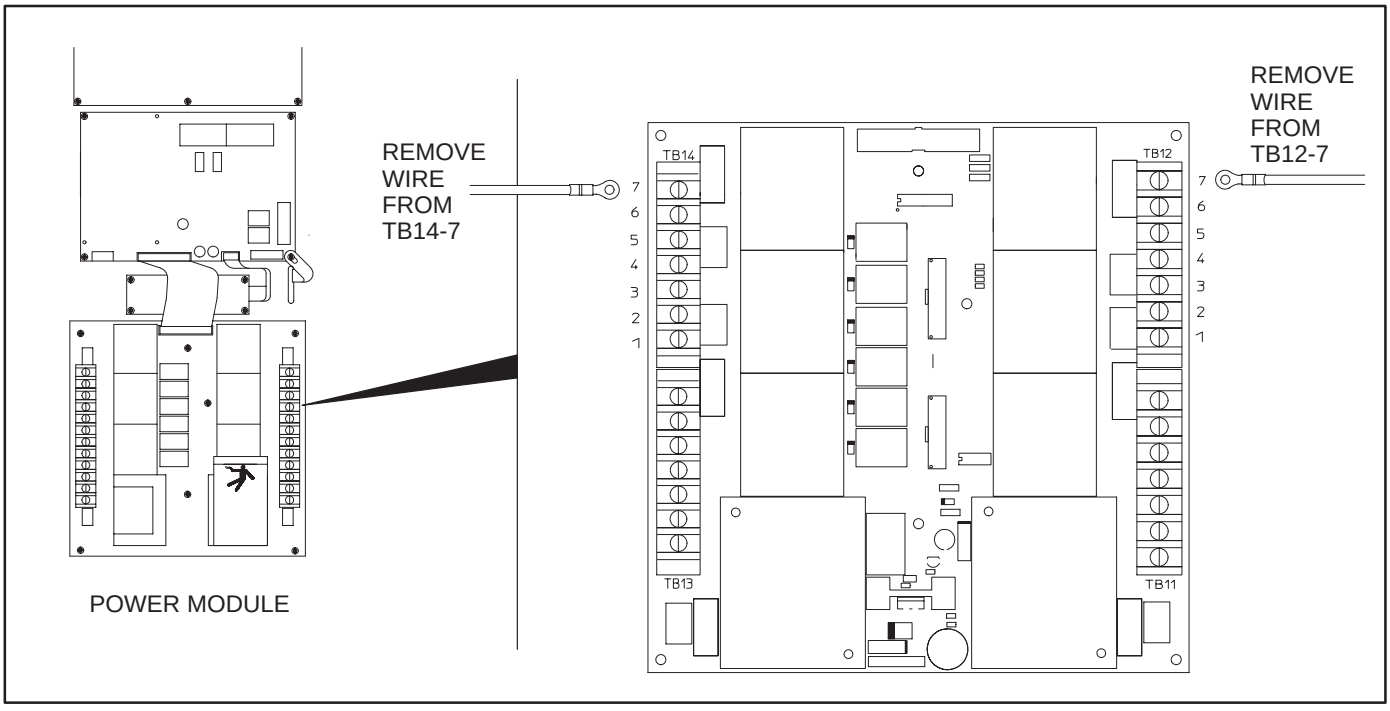

FIGURE 3-12. OPTIONAL DELTA CONFIGURATION JUMPER

Isolating Switch

The contractor must furnish and install a lockable isolating switch, with auxiliary contacts, on the Source 2 (generator) side of the ATS.

Supervision

The isolating switch auxiliary contacts must be connected to the ATS controls to prevent generator set starting when the isolating switch is open. Refer to the site interconnection drawing.

Separate ATS for Auxiliaries

A separate ATS must supply all pump room auxiliaries.

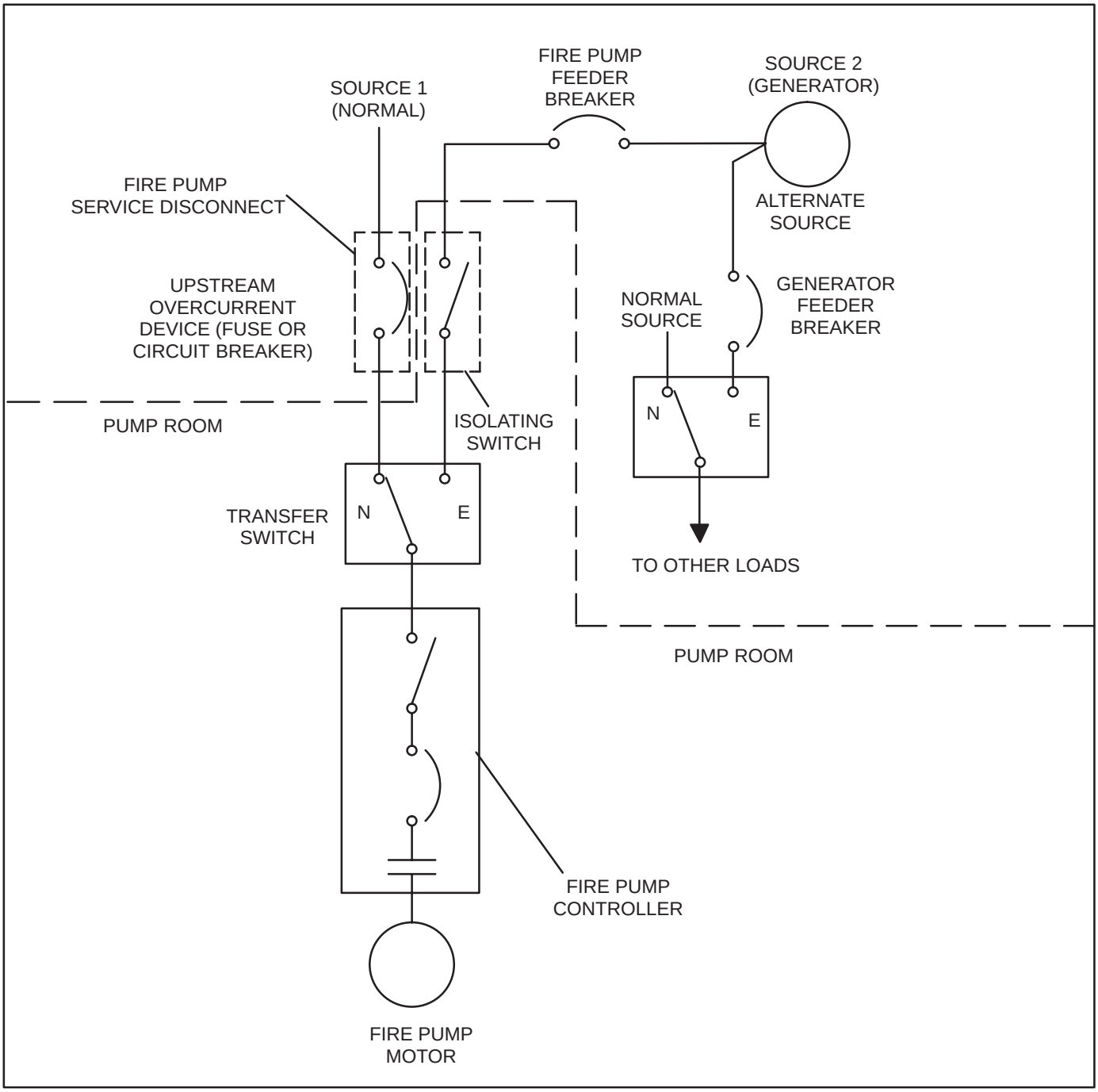

FIGURE 3-13. TYPICAL FIRE PUMP CONTROLLER AND TRANSFER SWITCH ARRANGEMENT

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 3-14):

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

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.

Installation is not yet complete.

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

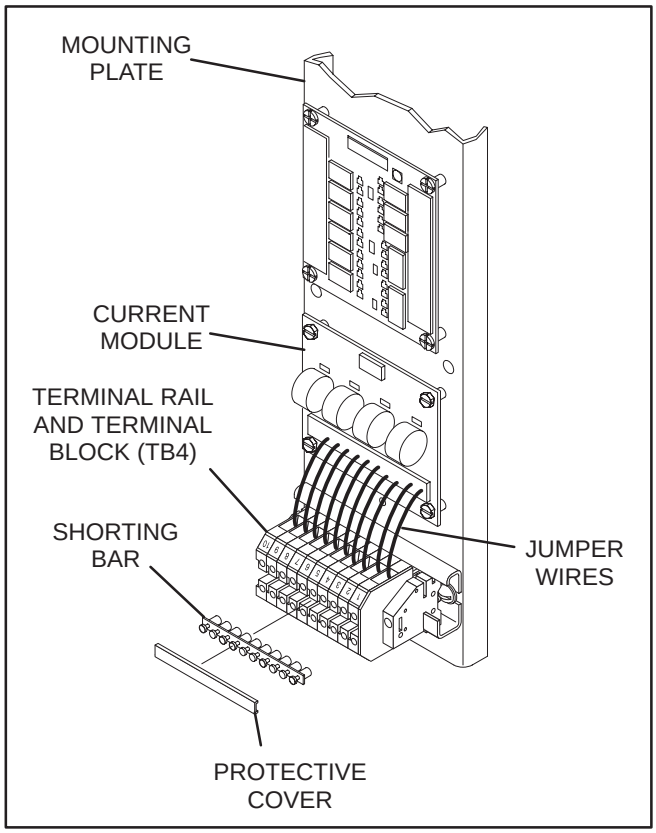

FIGURE 3-14. SHORTING BAR REMOVAL

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4. Setup and Adjustments

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

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 and 4-2) in the Off position before making adjustments. 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.

Install Digital Module and Network Communications Module Batteries

The digital module and the optional network communication module each require two batteries. These batteries are included with the transfer switch. Install the batteries in the two battery holders on the module(s). Orient batteries according to the polarity marks on the battery holders.

Connect the Battery (Utility to Genset and Genset to Genset Applications Only)

Make sure that the RUN switch on the generator is in the STOP position and connect the battery (negative [–] lead last). If applicable, reconnect the external battery charger.

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

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. The Source 1 Available and Source 1 Connected lamps should light.

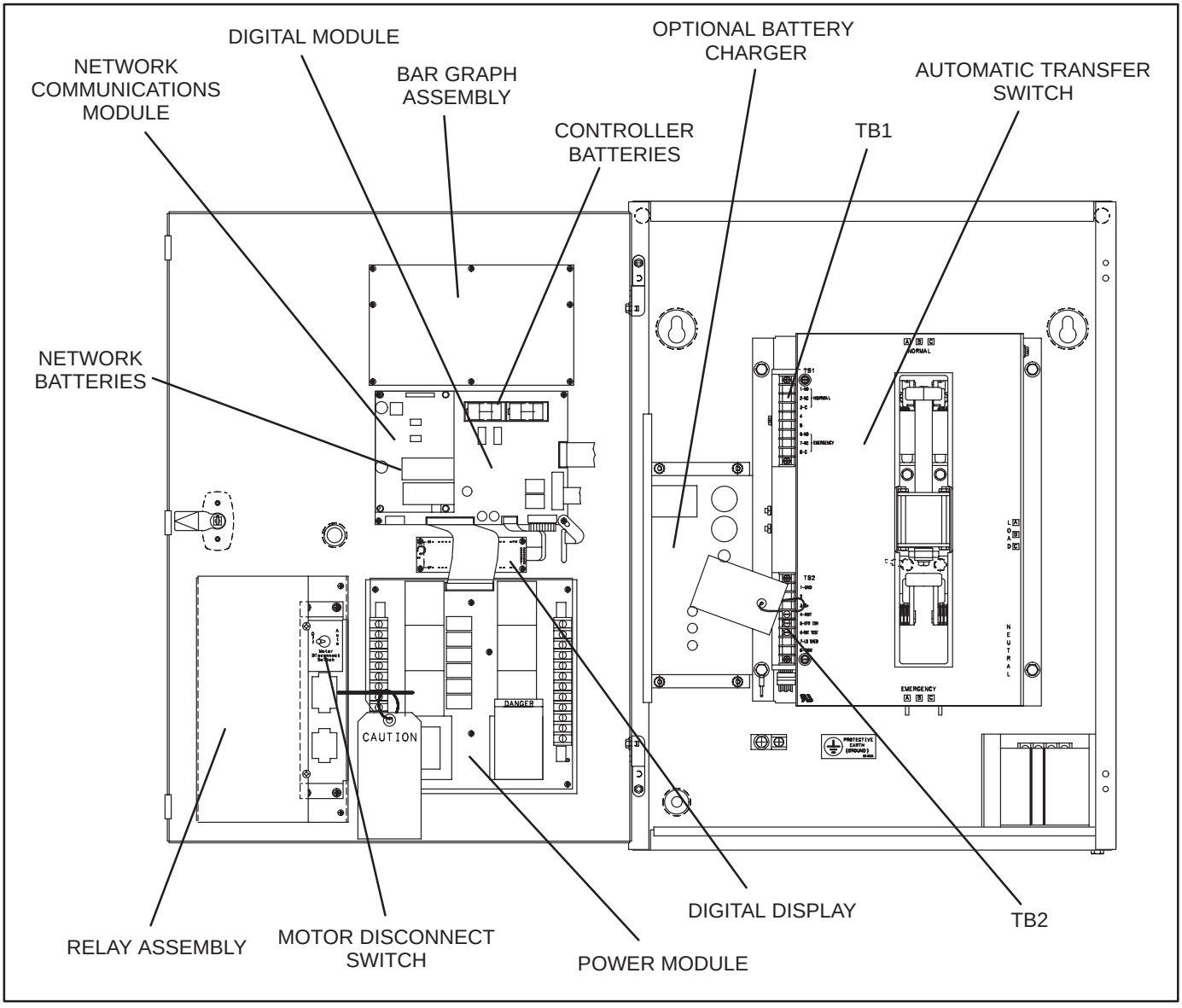


FIGURE 4-1. LOCATION OF CONTROL COMPONENTS (40 TO 125 AMP SWITCH SHOWN)

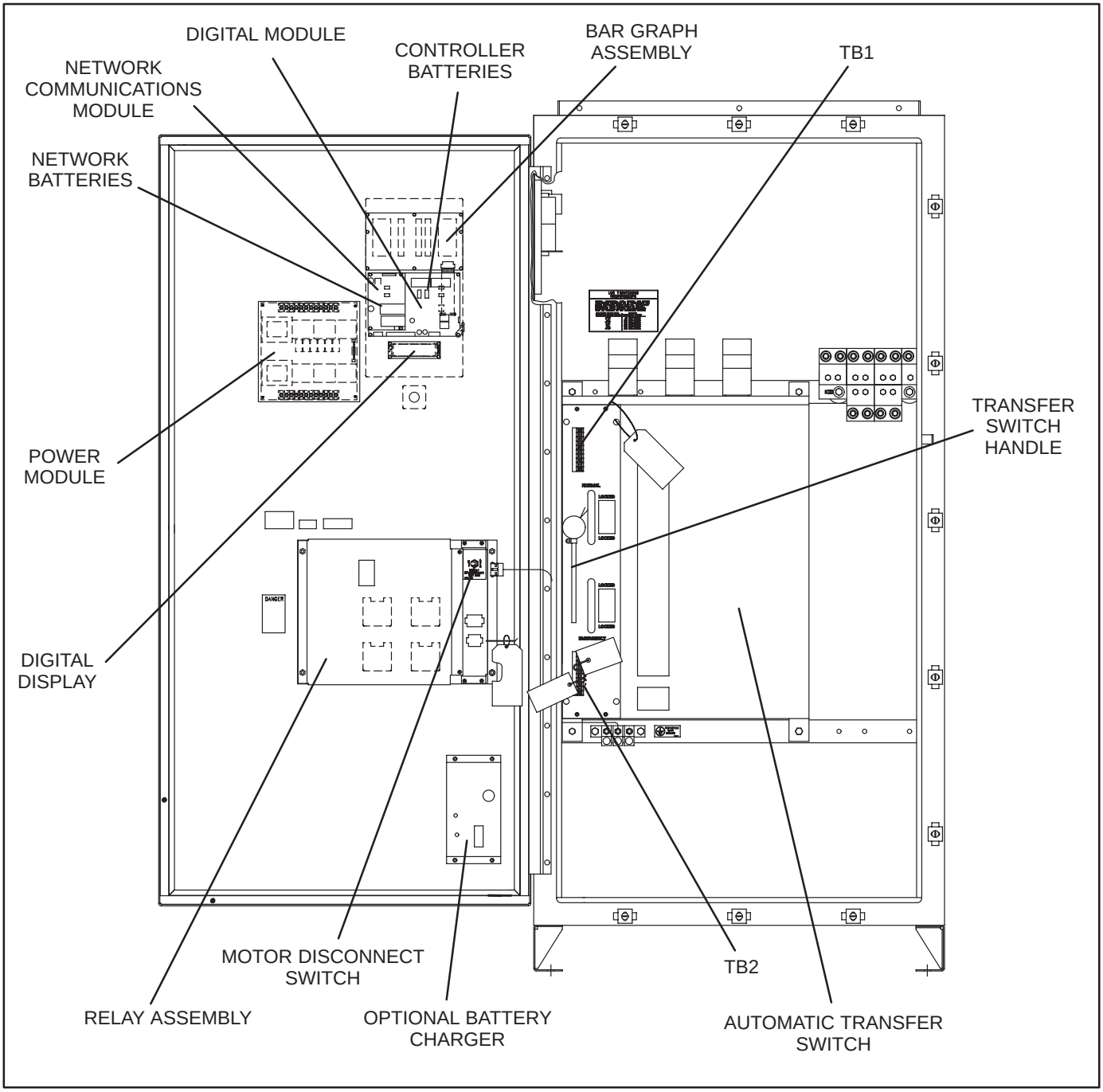


FIGURE 4-2. LOCATION OF CONTROL COMPONENTS (1200 AMP SWITCH SHOWN)

DIGITAL DISPLAY MENU

This section describes the Digital Display Menu System and navigation through the menus. The menus display status information, events, and set-up menus. Setup menus contain parameters with adjustable values. The descriptions in this section include ranges for the parameters and default values. The Digital Display is an option with Level 1 controls and is standard with Level 2 controls. See Figure 4-3.

The Digital Display Menu System is a 2-line by 20-character graphical display screen and six buttons. The screen or menu displays status information, parameters, events and messages. The buttons change screens and parameters. Two buttons have names: Home and Previous Menu. These buttons are used for navigation. Messages include navigational indicators for the other four buttons.

Main Menu

The main menu system consists of three top-level menus that list vertical menus (or sub-menus). The sub-menus display status information. This information cannot be changed in the main menus. The main menus contain eight sub-menus including the Setup Menus.

Setup Menu

To change setup parameters, you must enter a password (574); however, you can bypass the password and examine, but not change (read only), current parameter settings. When parameters are changed in any setup menu, you are prompted to either save the changes or restore the old values.

Navigation

Refer to Figures 4-34 through 4-36 at the end of this section for an overview of menu navigation. These illustrations can also be used to locate a submenu and determine how to access it.

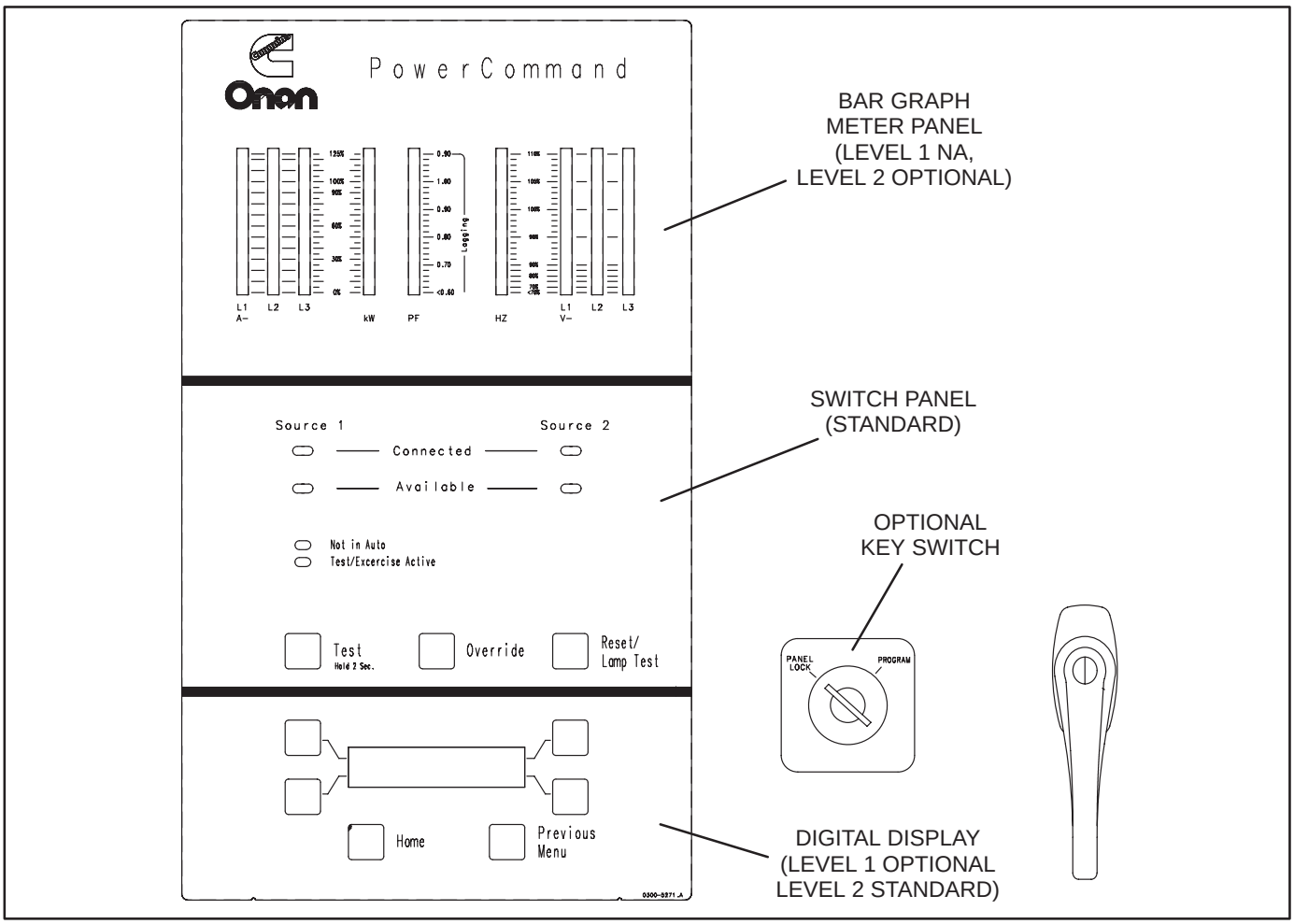
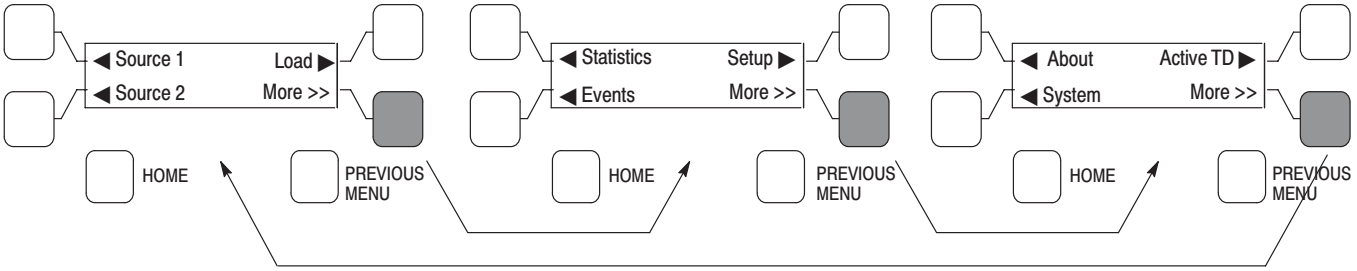


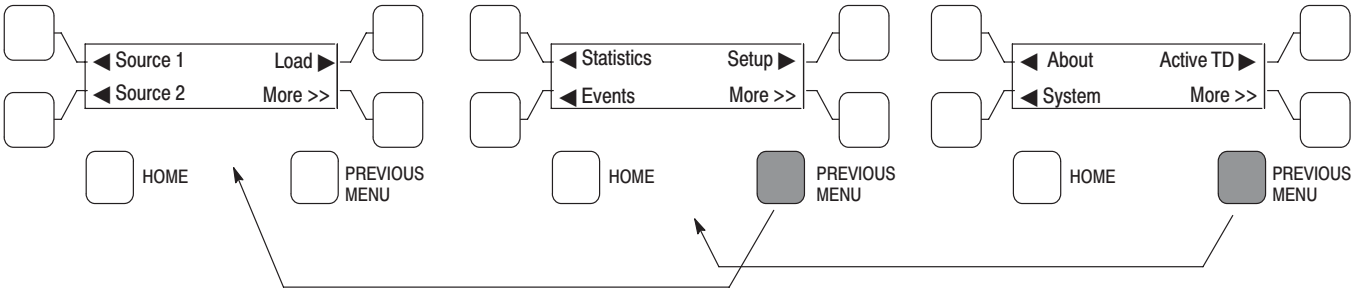
FIGURE 4-3. CABINET WITH OPTIONS

MAIN MENU NAVIGATION

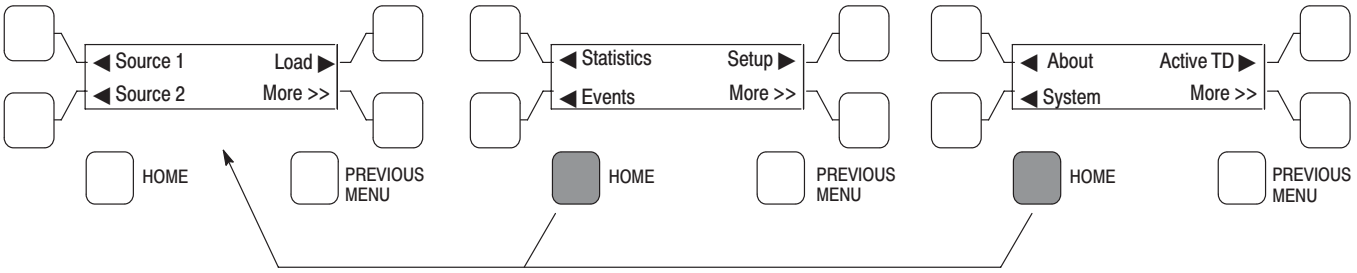
Using the MORE button



Using the PREVIOUS MENU button



Using the HOME button

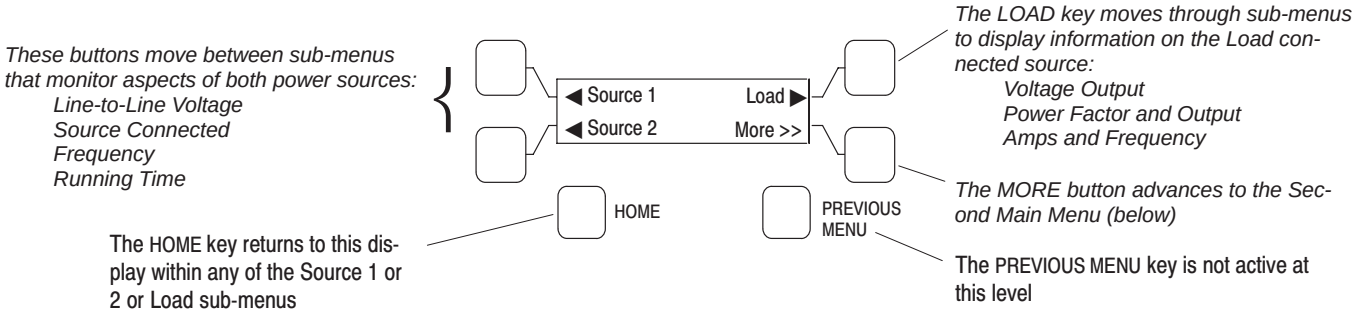


NOTE: The Active TD feature was not available in early versions of software.

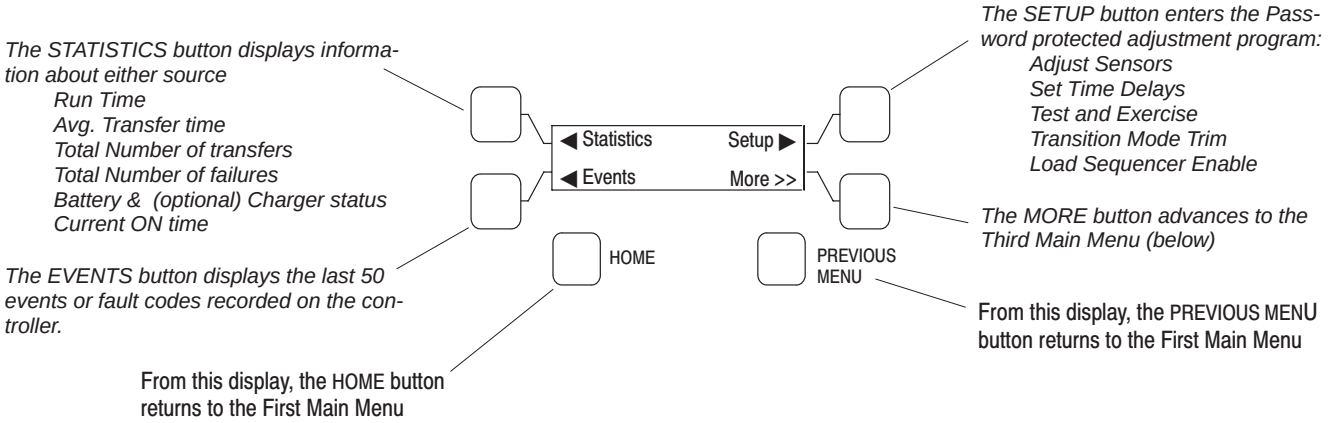
FIGURE 4-4. NAVIGATION

MAIN MENU DESCRIPTIONS

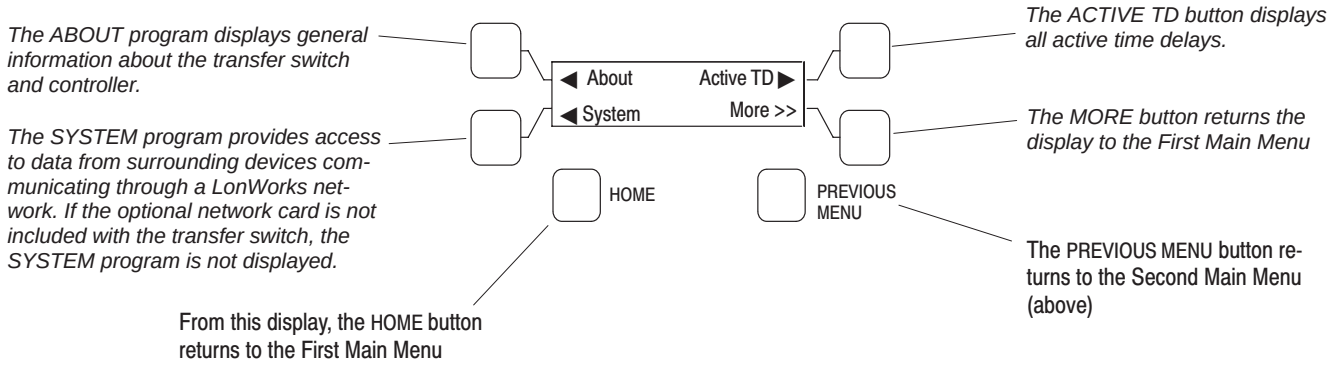
FIRST MAIN MENU



SECOND MAIN MENU



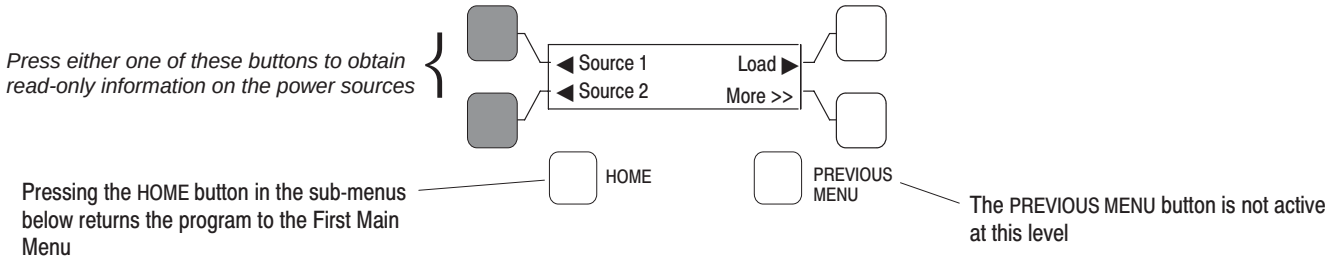
THIRD MAIN MENU



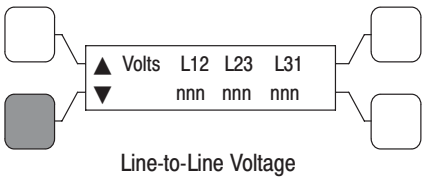
NOTE: The Active TD feature was not available in early versions of software.

FIGURE 4-5. MAIN MENUS

FIRST MAIN MENU – Source 1 and Source 2 Sub-Menus



Use the ▲▼ buttons on left to navigate through these screens



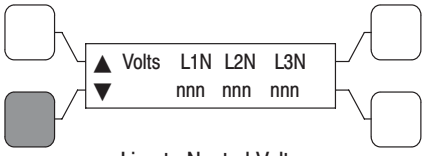
Line-to-Line Voltage

This screen displays line-to-line voltages for either Source 1 or Source 2 for three phase, two phase or single phase configurations.

If the voltage is measured at 10 volts or less, the display reads 0.

On Level 1 Controllers, only one voltage will be displayed at L12.

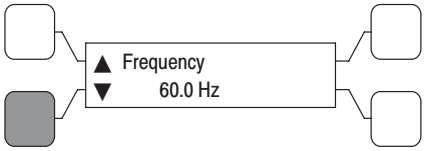
On Level 2 Controllers, if the Source is two phase, the display will read voltages at L12 and L31.



Line-to-Neutral Voltage

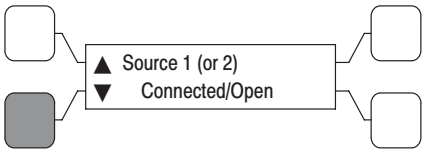
This screen displays Line to Neutral voltage measurements for three phase, two phase or single phase configurations. (Numbers do not display if system has no neutral)

This screen does not display with Level 1 controllers.



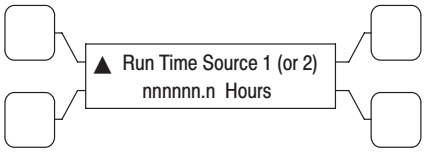
Sensed line frequency

This screen displays the sensed line frequency for Source 1 or 2.



Position of contactors

This screen displays the position of contactors for either Source 1 or 2.



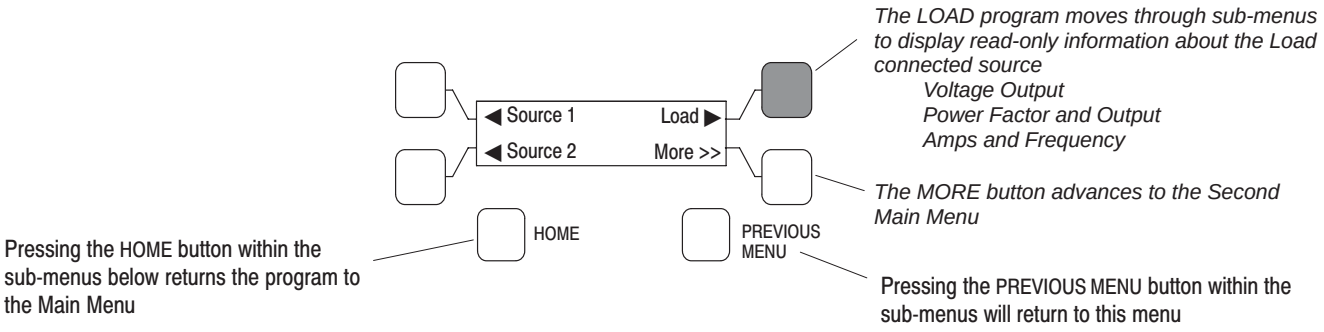
Total connection time

This screen displays the total time the transfer switch has been connected to either Source 1 or 2.

FIGURE 4-6. SOURCE 1 AND 2 SUB-MENUS

FIRST MAIN MENU – Load Sub-Menus

This subset is not available on Level 1 Control
and is optional on Level 2 Control



Use the ▲▼ buttons on left to navigate through these screens

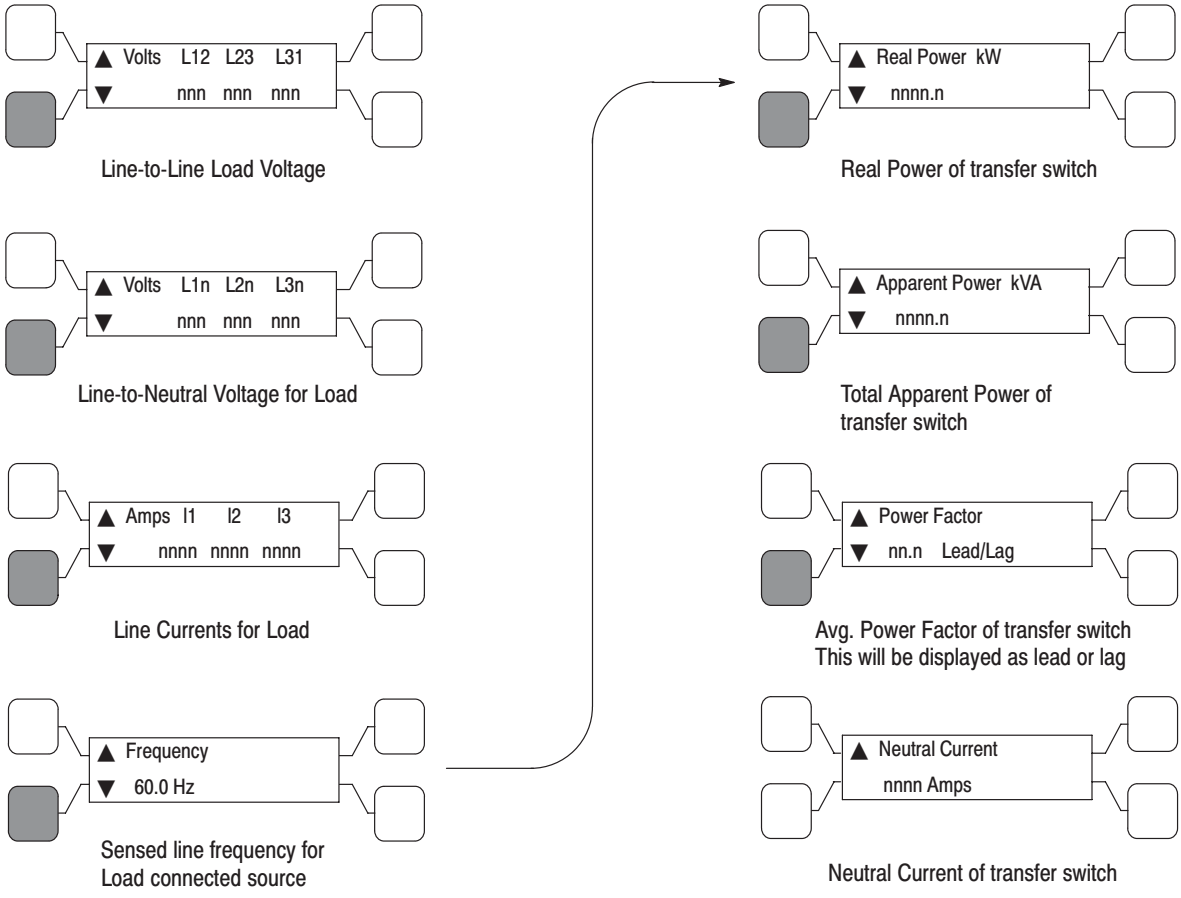
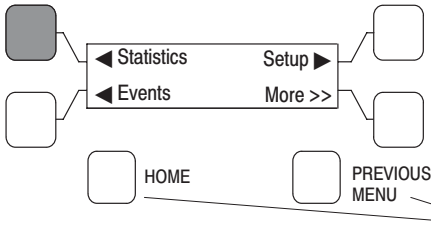


FIGURE 4-7. LOAD SUB-MENUS

SECOND MAIN MENU – Statistics Sub-Menus

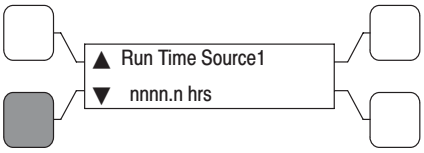
The STATISTICS program displays read-only information about either source:

- *Run Time*
- *Avg. Transfer time*
- *Total Number of transfers*
- *Total Number of failures*
- *Battery & (optional) Charger status*
- *Current ON time*

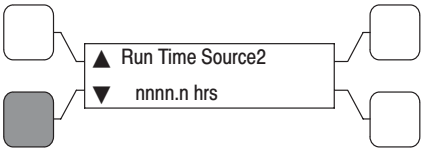


From this display, the PREVIOUS MENU and HOME buttons return the program to the First Main Menu

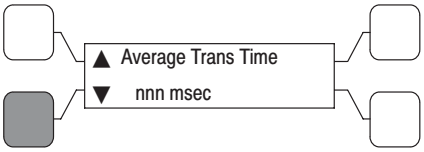
Use the ▲▼ buttons on left to navigate through these screens



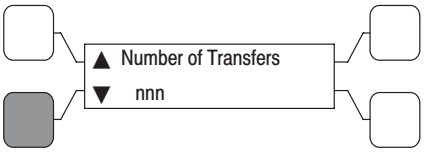
Total time the transfer switch has been connected to Source 1



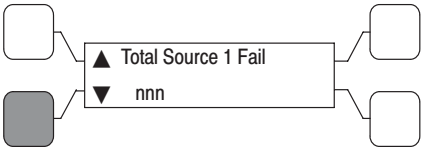
Total time the transfer switch has been connected to Source 2



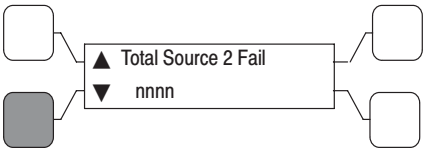
Average. transfer time over the last four transfers. Includes only time that both sources are disconnected. Sensing is disabled when Programmed Transition is active.



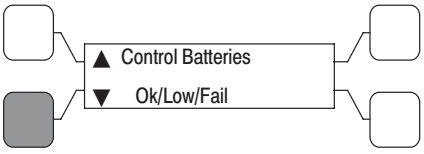
Total number of switch transfers in both directions



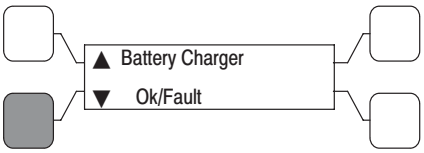
Total number of Source 1 failures



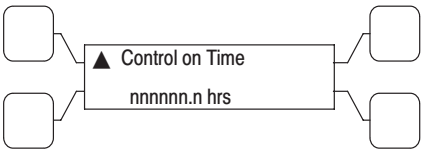
Total number of Source 2 failures (includes under-voltage, over-voltage, over/under frequency)



Status of lithium batteries on controller board



Status of optional generator battery charger



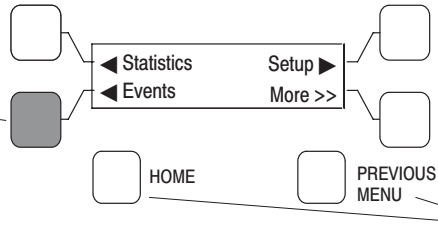
Displays the amount of time the controller board has been operating since initialization. Value is stored permanently.

FIGURE 4-8. STATISTICS SUB-MENUS

SECOND MAIN MENU – Events Sub-Menus

The EVENTS program displays information about either source. The controller stores and records the last fifty "events" in chronological order, beginning with the most recent event. The date and time are listed with each event.

The Events program include Fault codes, active time delays or significant power system changes.



From this display, the PREVIOUS MENU button and HOME button returns program to the First Main Menu.

Within the sub-menus, press the PREVIOUS MENU button anytime to return to this menu.

Use the ▲▼ buttons on left to navigate through these screens

Sample Events

⁎ Indicates Event is currently active

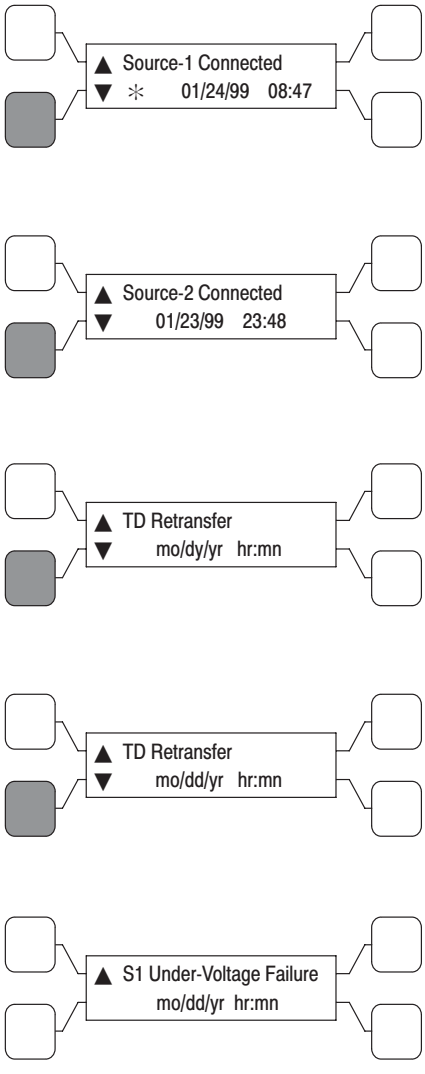
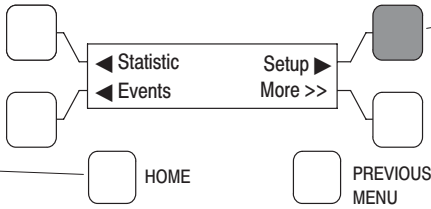


FIGURE 4-9. EVENTS SUB-MENUS

SECOND MAIN MENU – Setup Sub-Menus

Password



From this display, the PREVIOUS MENU button and HOME button returns program to the Main Menu.

The SETUP button enters the Password protected adjustment programs to:

Adjust Sensors
Set Time Delays
Test and Exercise
Exercise Exceptions
Transition Mode Trim
Load Sequencer Enable

The MORE button advances to the Third Main Menu.

Entering the Password Program

Press the Setup button to access the setup password menu.

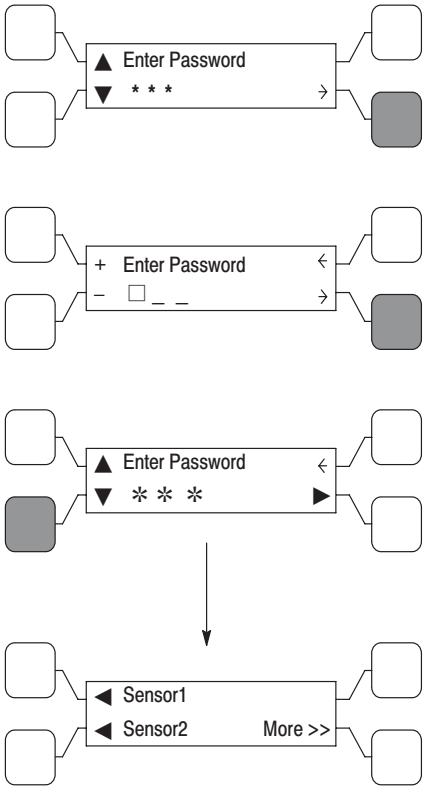
The password is 574.

Use the + and – buttons to select numbers.

Use the › button to move the cursor to the next field.

Note: Entering the password is required to change setup parameters. The setup menus can be viewed **(read-only)** by pressing the › button three times without pressing either the + or – buttons to select numbers.

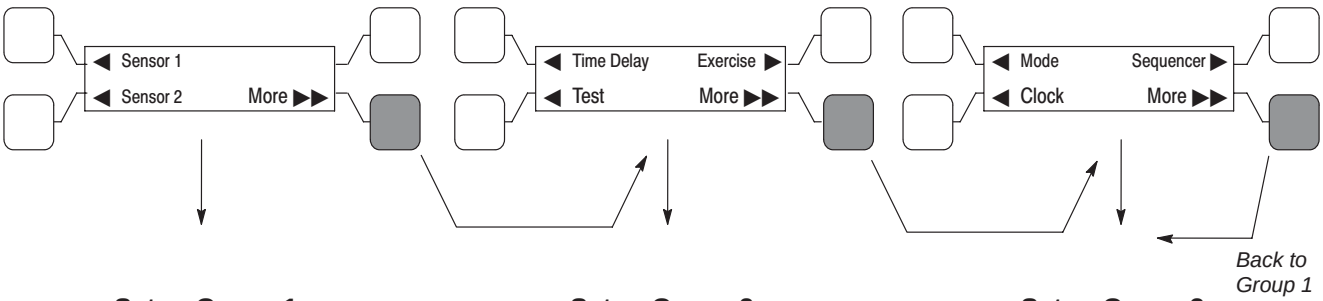
When the password is set, press the ▶ button to enter the setup program.



The Setup program is now accessed. This is the first Setup Menu screen.

FIGURE 4-10. PASSWORD SUB-MENUS

Setup Menu Navigation and Description



Setup Group 1

This group allows programming the operational parameters of the switch for Source 1 and Source 2.

The *Sensor Sub-Menus* are used for setting the:

- Phase Type
- Nominal Voltage
- Undervoltage Settings
- Overvoltage Settings
- Time Delays
- Frequency Settings
- Imbalance Settings
- Phase Loss
- Phase Rotation

See Figures 4-16 and 4-17 for Sensor Sub-menus.

Setup Group 2

The *Time Delay* sub-menus allow programming time for the:

- Engine Start
- Power Source 1 to Source 2
- Power Source 2 to Source 1
- Engine Cooldown
- Programmed Transition
- Elevator Pre-Transfer
- Genset to Genset Engine Controls

Refer to Figure 4-18 for Time Delay sub-menus.

Test sub-menus allow programming the front panel test switch to test the source with or without a load. If the configuration is genset to genset, Source 1 or 2 is selectable. See Figure 4-20.

Exerciser sub-menus allows programming an exercise routine for Power Source 2 and are available only on utility-to-genset controls. If Level 2 control is installed, a second exercise program can be setup. See Figure 4-21 or 4-23 for Exercise sub-menus. *Exercise* sub-menus also allow for adding and deleting exercise exceptions. See Figure 4-25 for Exercise Exceptions sub-menus. Up to 8 routines and exceptions can be programmed using the PC service tool.

NOTE: Exercise Exceptions sub-menus were not available on early versions of software.

Setup Group 3

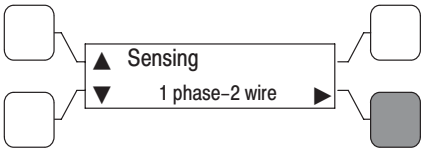
The *Mode* sub-menu allows programming the type of transition the switch uses. See Figure 4-27.

The *Clock* sub-menus program the time and date, as well as daylight savings time. See Figure 4-28.

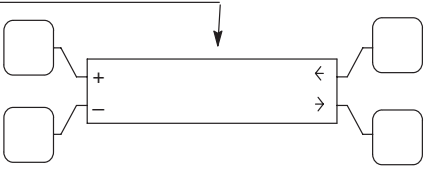
Load *Sequencer* is a software feature, available only with LonWorks NetWork Communication Module. This program allows the user to send a predetermined sequence of event announcements in a timed, sequential order to turn the load off and on. See FIgure 4-29.

FIGURE 4-11. SETUP DESCRIPTION

Changing Setup Parameters



When this button is pressed within any sub-menu, a cursor appears in the location of the editable field. In most cases, there is only one field to edit.



Use the + and – buttons to select numerical values or to toggle through a list of selections.

Default values are shown in parenthesis.

Use the › button to move the cursor to the next field.

When entering numerical values, the – button lowers the value to it's lowest range, then begins again at the top end of the range. The + button increases the value to its highest range, then begins again at the low end of the range.

If changes are made, press the › button to enter the new value and return to the previous menu.

Changing any data within the setup sub-menus will invoke a SAVE/RESTORE screen when exiting the Setup Sub-menu Groups.

If the PREVIOUS MENU button is pressed during an editing session, the data will not be changed.

If the HOME button is pressed during an editing session, the SAVE/RESTORE screen is invoked.

Saving or Restoring Setup Parameters

Changing any parameters within the Setup sub-menus invokes this screen when exiting the Setup sub-menu groups.

Use the Restore button to delete any setup parameter changes that were made during the current session. The program reverts to data from the previous session and does not save any changes.

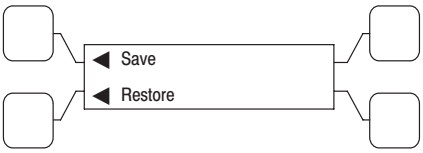


FIGURE 4-12. CHANGING SETUP PARAMETERS

VOLTAGE AND FREQUENCY SENSING

Under-Voltage Sensing

All controls include under-voltage sensors for Source 1 and Source 2. When a sensor detects a low voltage condition over a specified time period, it initiates a transfer. When the source voltage returns to an acceptable value again, the sensor initiates a retransfer.

These parameters are adjustable. The under-voltage sensing range for a falling voltage (drop-out) is 75 to 98% of the pick-up voltage setting. The default value is 90%. The pick-up range for a rising voltage is 85 to 100% of the nominal voltage setpoint. The default value is 90%. The adjustable range for the time delay period is 0.1 to 1.0 seconds in 0.1 second increments. The default delay time is 0.5 second. These values are set with the PC service tool or the digital display when it is available. See Figure 4-13 for an example using the default values.

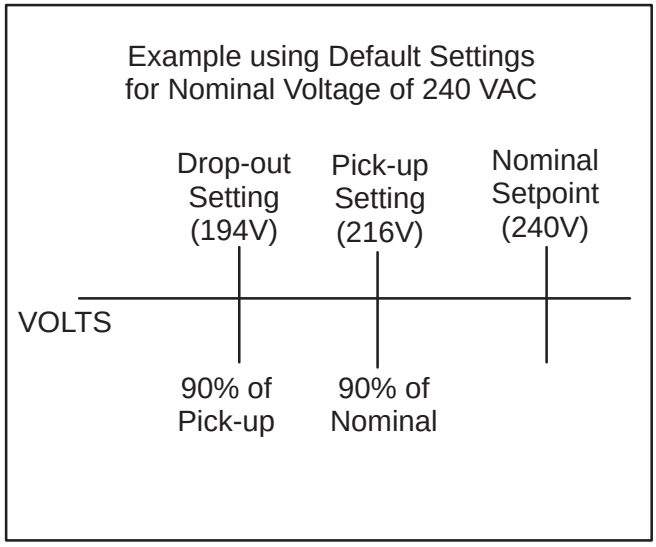


FIGURE 4-13. UNDER-VOLTAGE SENSING

Over-Voltage Sensing

All controls include over-voltage sensors for Source 1 and Source 2 that can be disabled and not used. When a sensor detects a high voltage condition over a specified time period (delay), it initiates a transfer. When the source voltage falls to an acceptable value again, the sensor initiates a retransfer.

These parameters are adjustable. The over-voltage sensing range (drop-out) for a rising voltage is 105 to 135% of the nominal voltage setpoint. The default value is 110%. The pick-up range for a falling voltage is 95 to 100% of the drop-out setting. The default value is 95%. The adjustable range for the delay time period is 0.5 to 120.0 seconds in 1 second intervals. The default delay time is 3.0 seconds. The over-voltage sensing feature is enabled by default. These values are set with the PC service tool or the digital display when it is available. See Figure 4-14 using the default values.

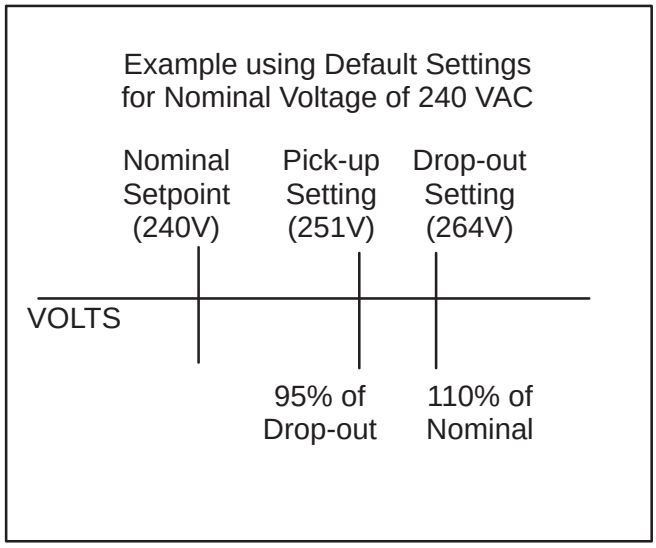


FIGURE 4-14. OVER-VOLTAGE SENSING

Frequency Sensing

All controls include frequency sensors for Source 1 and Source 2 that can be disabled and not used. When a sensor detects a high or low frequency condition over a specified delay time period, it initiates a transfer. When the frequency returns to an acceptable value again, the sensor initiates a retransfer.

These parameters are adjustable. The nominal frequency can be set between 45.0 and 60.0 Hz in 0.1 Hz increments. The default frequency is 60 Hz. The acceptable frequency bandwidth (pick-up) is ±5 to ±20% of the nominal frequency setpoint. The default value is 10%. The drop-out frequency is 1 to 5% beyond the pick-up. The default value is 1%. The range for the delay time period is 0.1 to 15 seconds. The default delay time is 1.0 second. The frequency sensing feature is enabled by default. These values are set with PC service tool or the digital display when it is available.

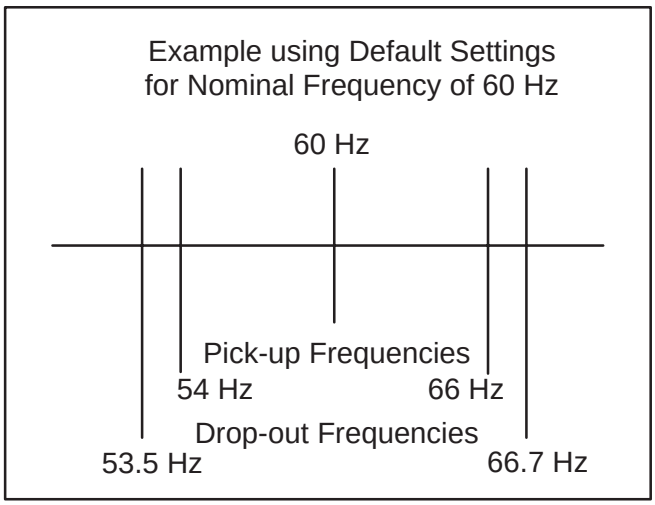


FIGURE 4-15. FREQUENCY SETTING

Voltage Imbalance Sensing

Three phase Level 2 controllers include a voltage imbalance sensor for both Source 1 and Source 2. This feature informs the operator when there is significant voltage imbalance between the phases of Source 1 or Source 2. This feature is used for equipment protection.

A voltage imbalance is typically caused by severe single phase loading. The sensor indicates a failure when the maximum deviation from the average voltage is greater than a user-specified value between 2 and 10 % (drop-out) of the average voltage in 1% increments. The pickup value is fixed at 10% of the drop-out. The time delay for the imbalance sensor drop-out is adjustable (2–20 seconds).

To enable this sensor, see Figure 4-17. This sensor is inactive for single phase systems and indicates no failures. To prevent nuisance faults, the setting can be increased up to 10 % of the nominal voltage.

Phase Rotation Sensing

Three phase Level 2 controllers include a phase rotation sensor. This feature monitors the phase rotation of the source opposite from the connected source. When the alternate source is out of phase rotation with the connected source, transfer is inhibited. This generally occurs on new installations or after storm damage or generator rewiring. This feature protects against equipment damage by preventing transfer to a source that is out of phase. This feature is required in fire pump applications.

⚠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.***

Both voltage sources have to be applied in order to check phase rotation. Generally, a power source may become out of phase rotation in new installations, after a storm, or when there is generator rewiring.

This feature is enabled by default. To disable it, see Figure 4-17.

Loss of Single Phase Sensing

Three phase Level 2 controllers include a loss of single phase sensor. This feature initiates a transfer from a source that has lost a single phase and prevents a transfer to a source that has lost a single phase. This is generally caused by a single phase to line ground or open. The controller indicates a fault when the relative phase angle between any line-to-line phase angle drops to less than 90°. This feature is mainly used to protect three phase devices, such as motors.

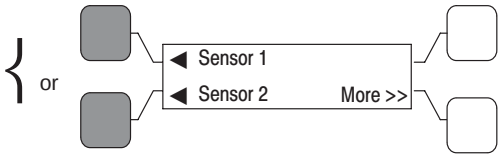
To enable this sensor, see Figure 4-17. This sensor is inactive for single phase systems and indicates no failures.

Setup – *Group 1*

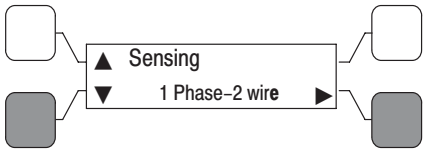
Sensor 1 & Sensor 2 Sub-Menus

Sensor 1 and Sensor 2 sub-menus are identical except:

S1 refers to Source 1
S2 refers to Source 2



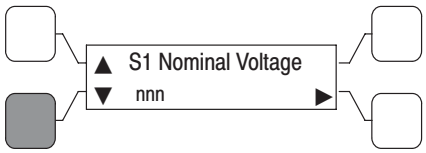
For 2-wire system, select:
1 phase–2 wire
For a single phase - 3 wire system, select: 1 phase–3 wire
For a 3 phase system, select:
3 phase



System Voltage for Source 1 or 2

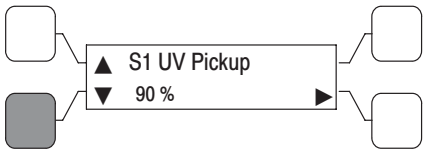
Enter the system voltage between 110 and 600 VAC

Note: Level 1 Controls are Line-to-Line Voltages and Level 2 Controls are Line-to-Neutral Voltages.



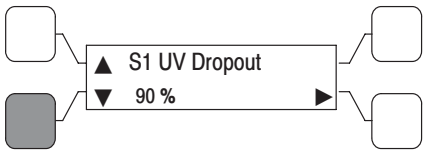
Under-Voltage Sensor Pick-Up

Enter a number between 85 and 100% of the nominal voltage (90%)



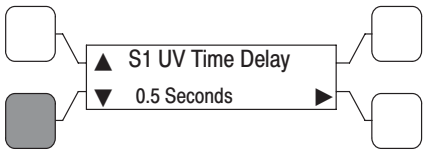
Under-Voltage Sensor Drop-Out Voltage

Enter a number between 75 and 98% of the under-voltage pick-up percentage (90%)



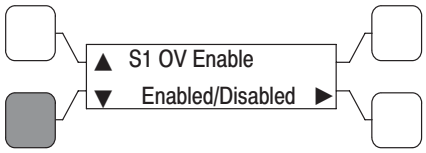
Under-Voltage Drop-Out Time Delay

Enter a time between 0.0 and 1.0 seconds (0.5)



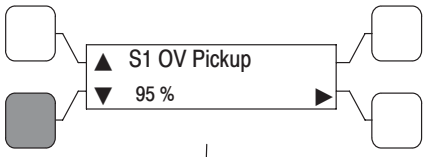
Over-Voltage Sensing Enable

Choose Enabled or Disabled (Enabled)



Over-Voltage Pick-Up
This adjusts the over-voltage pick-up as a percentage of the over-voltage drop-out

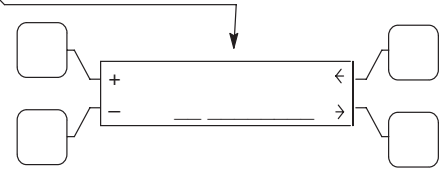
Enter a number between 95 and 99% (95%)



Note: Default values are in parenthesis.

Continued on next page

When this button is pressed in any sub-menu, a cursor appears in the location of the editable field. In most cases, there is only one field to edit.



Use the + and – buttons to select numerical values or to toggle through a list of selections.

Default values are shown in parenthesis)

When entering numerical values, the – button lowers the value to its lowest range, then begins again at the top end of the range. The + button increases the value to its highest range, then begins again at the low end of the range.

Use the → button to move the cursor to the next field.

If changes are made, press the → button to enter the new value and return to the previous menu.

Changing any data within the setup sub-menus will invoke a SAVE/RESTORE screen when exiting the Setup Sub-menu Groups.

If the PREVIOUS MENU button is pressed during an editing session, the data will not be changed.

If the HOME button is pressed during an editing session, the SAVE/RESTORE screen is invoked.

FIGURE 4-16. SETUP GROUP 1 – SENSOR SUB-MENUS

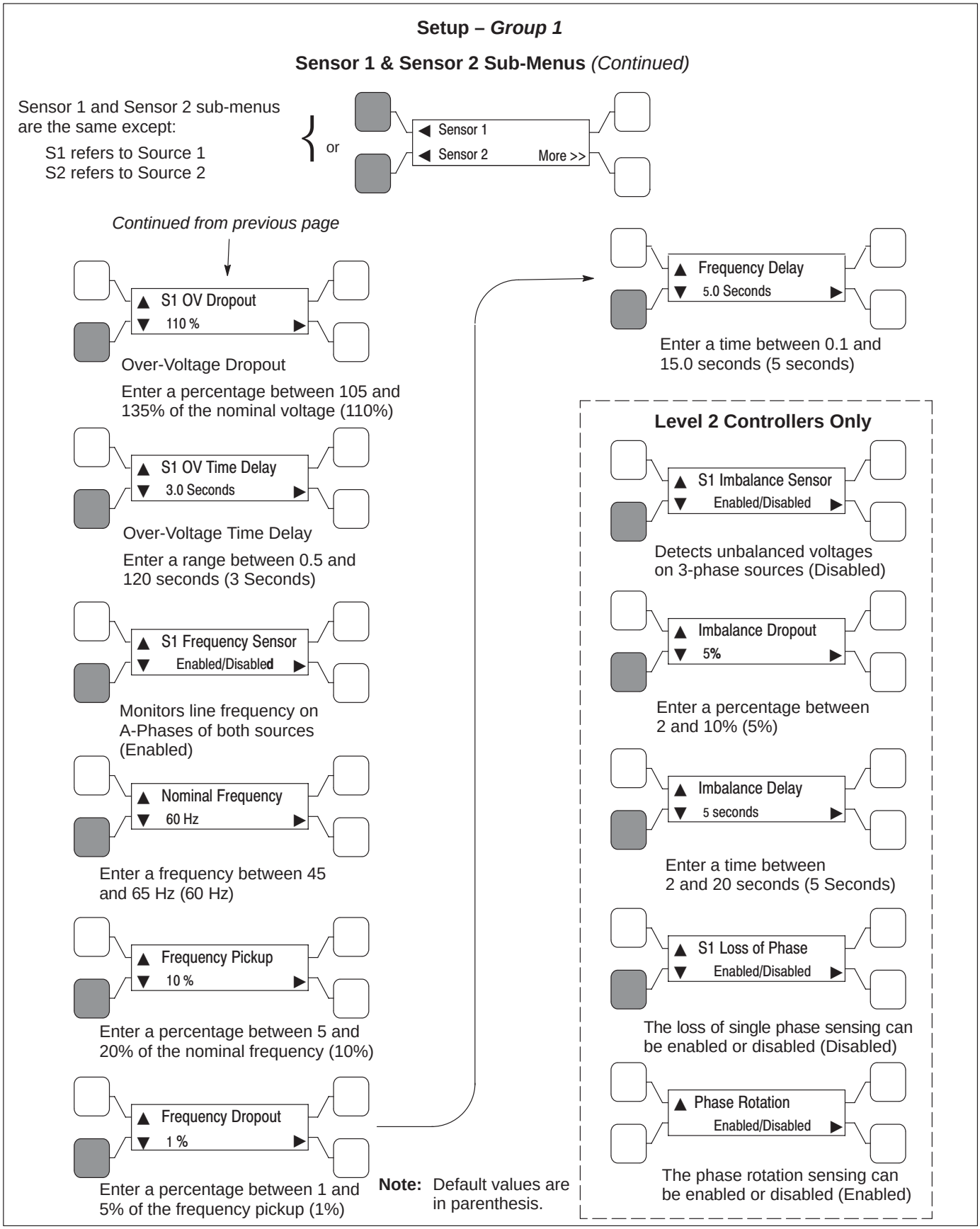


FIGURE 4-17. SETUP GROUP 1 – SENSOR SUB-MENUS (Continued)

POWER COMMAND TIME DELAYS

Start Time Delay (TDES, TDES-A, and TDES-B): This delay is adjustable from 0 to 15 seconds in 1 second increments on Level-1 controls and from 0 to 120 seconds in 1 second increments on Level-2 controls. The default value is 3 seconds for both. This brief time delay prevents generator set starting during short power interruptions. Timing starts the moment of Source 1 power interruption. If the duration of interruption exceeds the delay time, the control system signals the generator set to start. The value is set with PC service tool or the digital display when it is available.

For genset-to-genset applications, TDES-A is the start time delay to start Power Source 2 genset and TDES-B is the start time delay to start Source 1 genset.

Stop Time Delay (TDEC, TDEC-A, and TDEC-B): This delay is adjustable from 0 to 30 minutes in 1 minute increments. The default value is 10 minutes. It begins timing when the load is retransferred to Source 1. At the end of the delay, the stop signal is sent to the generator set. During this time delay, the generator set cools down at no load before stopping. The value is set with PC service tool or the digital display when it is available.

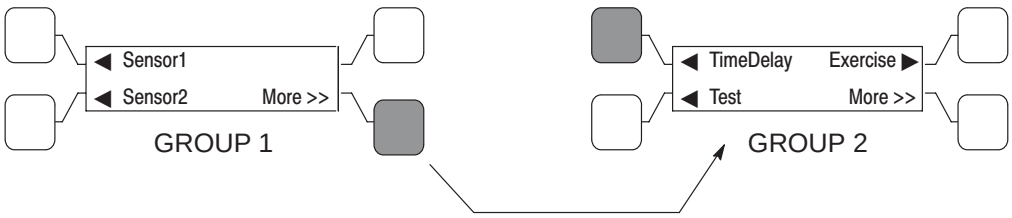
For genset-to-genset applications, TDEC-A is the stop time delay to stop Power Source 2 genset and TDEC-B is the stop time delay to stop Source 1 genset.

Transfer Time Delay (TDNE): This delay begins when Source 2 (typically the generator) voltage and frequency reach the settings of the control. After the delay, the transfer switch transfers the load to Source 2. This brief time delay allows the generator set to stabilize before the load is applied. It has an adjustable range of 0 to 120 seconds in 1 second increments. The default value is 10 seconds. The value is set with the PC service tool or the digital display when it is available.

Retransfer Time Delay (TDEN): This delay begins the moment Source 1 line voltage and frequency return to specified values. After the delay, the transfer switch can retransfer the load to Source 1. The delay allows the Power Source 1 to stabilize before retransfer. It has an adjustable range of 0 to 30 minutes in 1 minute increments. The default value is 10 minutes. The value is set with PC service tool or the digital display when it is available.

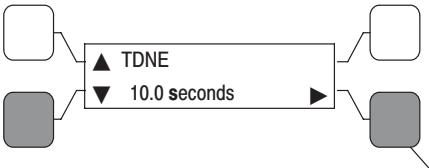
Setup – *Group 2*

Time Delay Sub-Menus

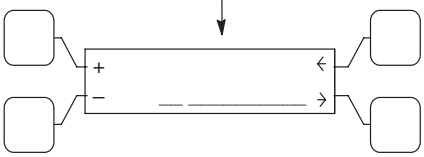


In a Normal to Emergency transfer this function allows Source 2 to stabilize before the load is applied.

Enter a time from 0 to 120 seconds (10 seconds).



When this button is pressed in any sub-menu, a cursor appears in the location of the editable field. In most cases, there is only one field to edit.

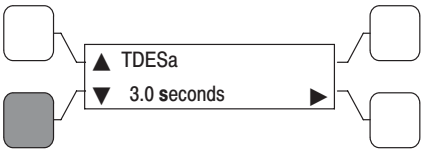


In a Emergency to Normal transfer this allows Source 1 to stabilize before re-transfer.

Enter a time from 0 to 30 minutes (10 minutes).

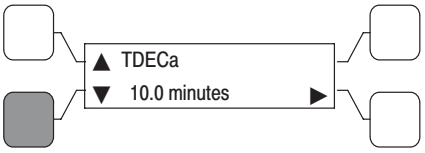
Sets the time delay for Engine Start on genset (a) used in a utility-generator and generator-generator mode. Prevents nuisance genset starting during brief power interruptions. This menu does not appear in utility-to-utility installations.

Enter a range from 0 to 120 seconds (3.0 seconds). See Note 2.



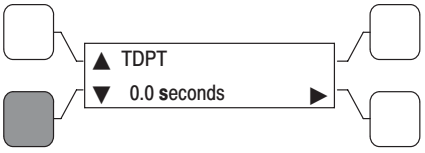
Sets the time delay for Engine Cool-down following a re-transfer. This menu does not appear in utility-to-utility installations.

Enter a time from 0 to 30 minutes (10 minutes).



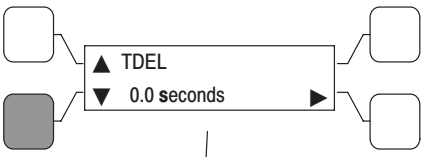
Sets the time delay for Programmed Transition setting of 0.0 disables the program.

Enter a time from 0 to 60 seconds (0 seconds).



Sets the time delay to wait for an elevator pre-transfer signal.

Enter a time from 0 to 60 seconds (0 seconds).



Continued on next page

Use the + and – buttons to select numerical values or to toggle through a list of selections.

Default values are shown in parenthesis.

Use the → button to move the cursor to the next field.

When entering numerical values, the – button lowers the value to its lowest range, then begins again at the top end of the range. The + button increases the value to its highest range, then begins again at the low end of the range.

If changes are made, press the → button to enter the new value and return to the previous menu.

Changing any data within the setup sub-menus will invoke a SAVE/RESTORE screen when exiting the Setup Sub-menu Groups.

If the PREVIOUS MENU button is pressed during an editing session, the data will not be changed.

If the HOME button is pressed during an editing session, the SAVE/RESTORE screen is invoked.

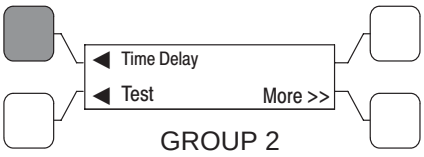
Note: Default values are in parenthesis.

Note 2: On early versions of software, the sequence of the first three menus were as follows: TDESa, TDNE, and TDEN.

FIGURE 4-18. SETUP GROUP 2 – TIME DELAY SUB-MENUS

Setup – *Group 2*

Time Delay Sub-Menus *(Continued)*



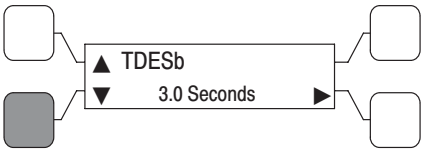
This group is used only in Genset to Genset applications

Continued from previous page

Level 2 Controller Only

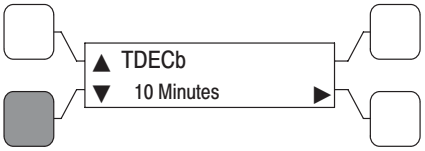
Sets the Engine Start time delay to for genset (b).

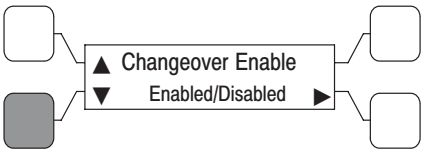
Enter a time from 0 to 120 seconds (3 seconds)



Sets the time delay for Engine Cooldown to begin.

Enter a time of 0 to 30 minutes (10 minutes)





If Changeover Enabled is enabled, this menu sets the amount of time a single generator can be run before switching to the other generator.

Enter a time from 1 to 336.0 hours (24 hrs)

Note: Default values are in parenthesis.

FIGURE 4-19. SETUP GROUP 2 – TIME DELAY SUB-MENUS (Continued)

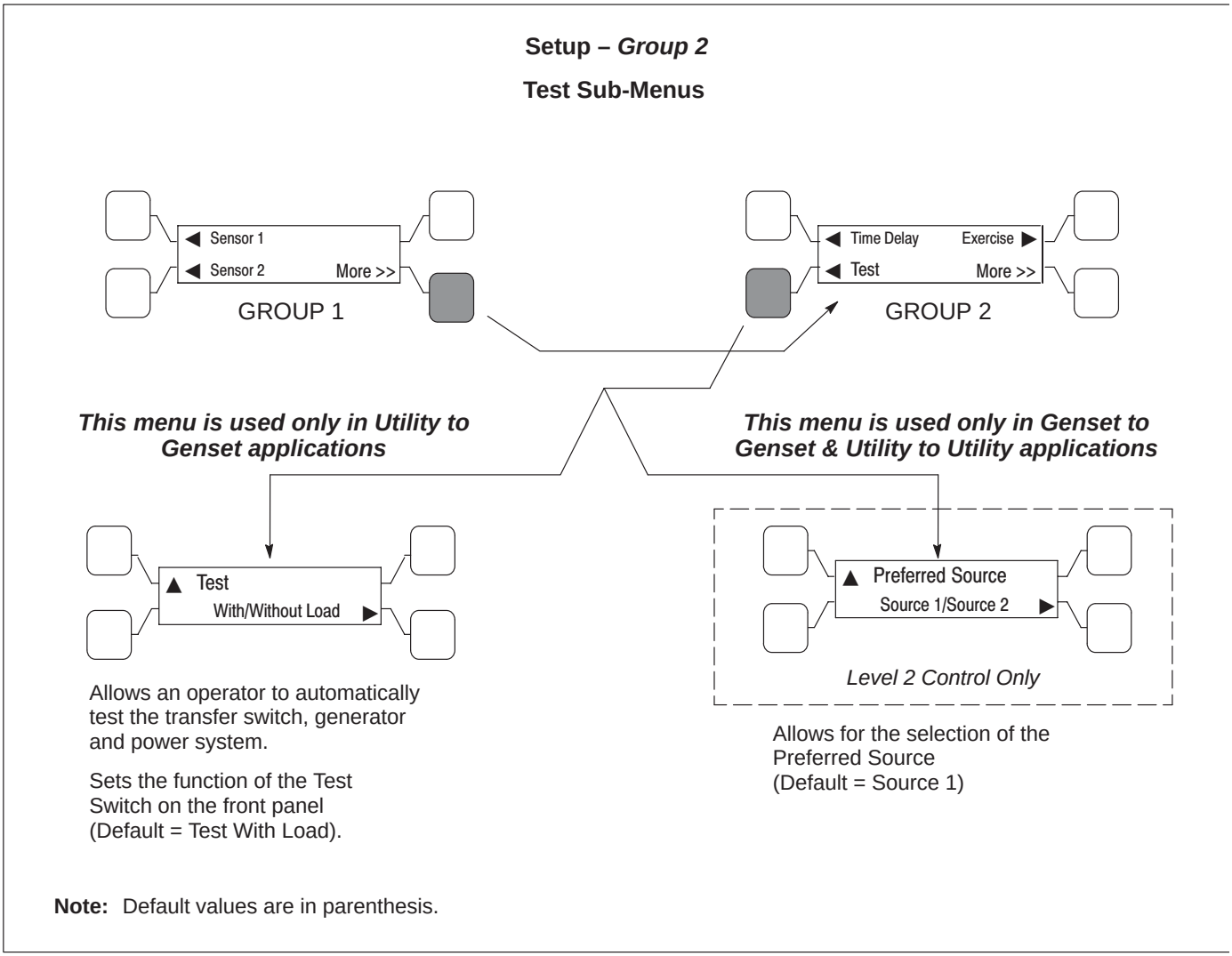


FIGURE 4-20. SETUP GROUP 2 – TEST SUB-MENUS

PROGRAMMABLE GENERATOR EXERCISER

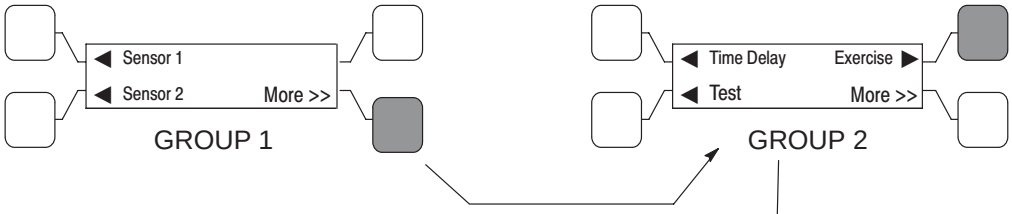
Level 1 controllers include one programmable generator exercise event and Level 2 controllers include eight programmable generator events and eight programmable exceptions. These events are generally programmed to be recurring. They can be programmed from the PC service tool or the digital display when it is available. All controllers have a push-button switch on the digital module that enables and disables the exerciser clock. See the Digital Display Menu System section for details on setting the clock.

For utility-to-genset configurations, the exerciser clock initiates genset start and run cycles at specified intervals for specified durations. This clock is not used in utility-to-utility or genset-to-genset configurations.

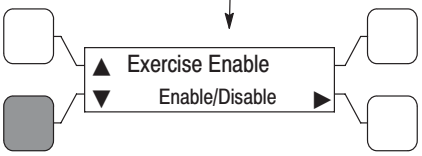
Setup – *Group 2*

Exerciser Sub-Menus – Software Versions Prior to 1.5.190

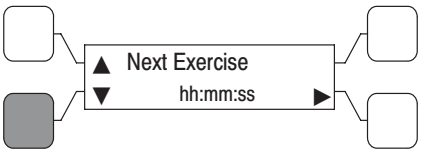
These sub-menus are available only in Utility-to-Genset applications.



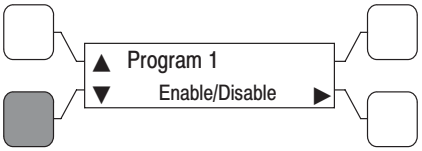
Enables or disables all the functions of exercising the generator(s)



Displays the Time remaining until the next exercise cycle. This display is readable only when the exerciser is Enabled (May not be displayed in Software Version 1.0)

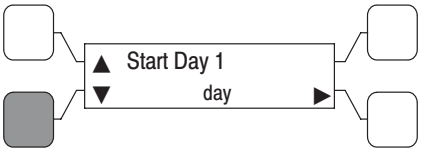


This screen allows disabling Exercise Program 1 only



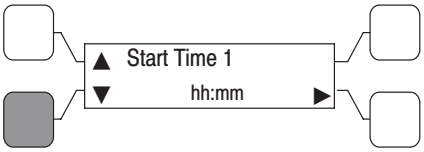
The first of four programming sub-menus for the Exerciser cycle. Sets the day an Exercise cycle will occur

Select a day between Sunday=0 and Saturday=6



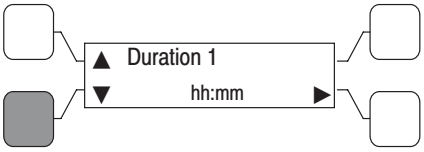
Sets a Time for the exercise cycle to begin

Enter a time within a 24 hour period: hh = 0 – 23, mm = 0 – 59.



Sets the length of Time the exercise cycle will run

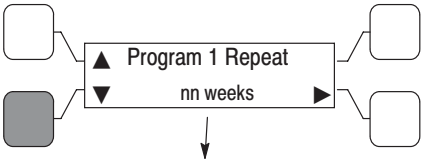
Enter a time within a 24 hour period: hh = 0 – 23, mm = 0 – 59.



Sets an Interval the exercise cycle will repeat

Enter a cycle between 0 and 52 weeks

Typical values are 1 or 2



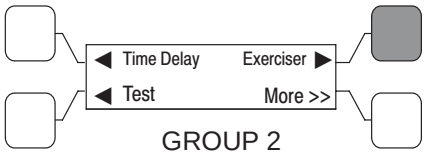
Only one program is available for Level 1 Controllers

Continued on next page

FIGURE 4-21. SETUP GROUP 2 – EXERCISER SUB-MENUS (SOFTWARE VERSIONS PRIOR TO 1.5.190)

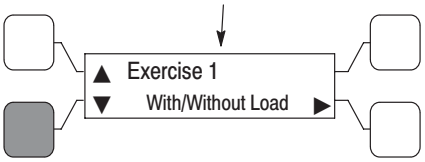
Setup – *Group 2*

Exerciser Sub-Menus – Software Versions Prior to 1.5.190 *(Continued)*



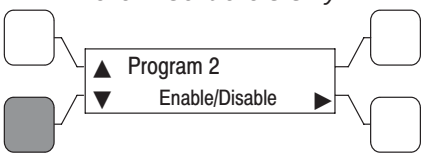
Level 2 Controllers allow for two exercise programs to be setup from the Setup menu screen. Six additional programs and eight exceptions can be setup using the PC Service Tool.

Continued from previous page

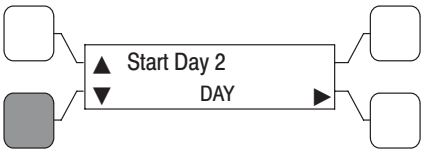


Enables or disables exercising the generator(s) with or without a load

Level 2 Controllers Only

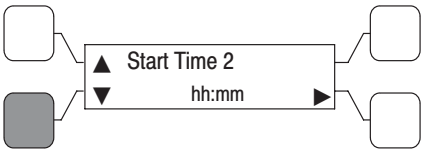


This screen allows disabling Exercise Program 2 only



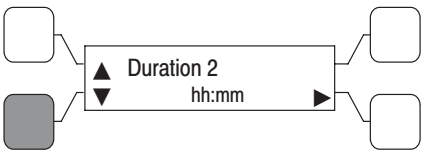
Sets the day of the second exercise cycle.

Enter a day between Sunday = 0 and Saturday = 6.



Sets the time the second exercise cycle will begin

Enter a time within a 24 hour period: hh = 0 – 23, mm = 0 – 59.

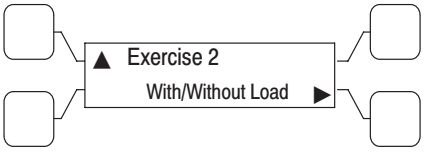


Sets a time limit the second exercise cycle will run

Enter a time within a 24 hour period: hh = 0 – 23, mm = 0 – 59.

Sets an Interval the second exercise cycle will repeat

Enter a range from 0 to 52 weeks. Typical values are 1 or 2.



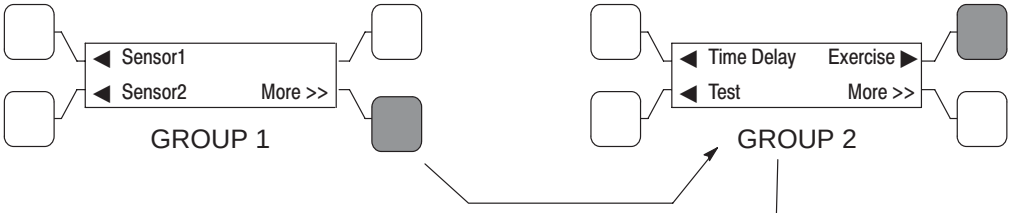
Enables or disables the second exercise program to run the generator(s) with or without a load

FIGURE 4-22. SETUP GROUP 2 – EXERCISER SUB-MENUS (SOFTWARE VERSIONS PRIOR TO 1.5.190) (Continued)

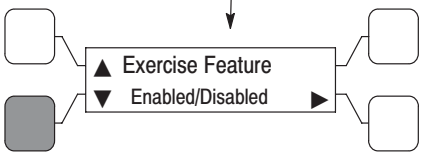
Setup – *Group 2*

Exerciser Sub-Menus – Starting with Software Version 1.5.190

These sub-menus are available only in Utility-to-Genset applications.

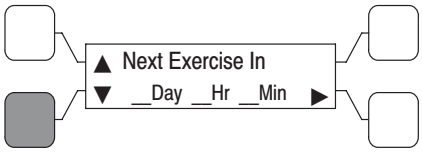


Enables or disables all the functions of exercising the generator(s). (Default = Disabled)

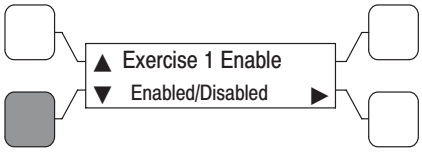


Note: Instead of "Exercise Feature," this menu is titled "Exercise Enable" in some early versions of software. This menu is no longer included with current software.

Displays the Time remaining until the next exercise cycle. If no exercises are enabled, the message "No Next Exercise" is displayed.

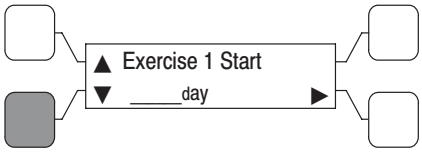


This screen allows disabling Exercise 1 only. (Default = Disabled)



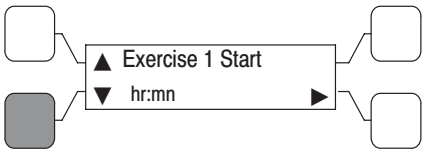
The first of four programming sub-menus for the Exercise cycle. Sets the day an Exercise cycle will occur

Select a day between Sunday and Saturday. (Default = Sunday)



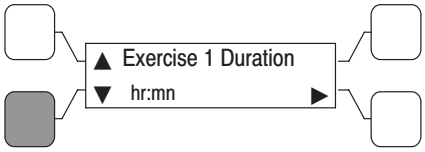
Sets a Time for the exercise cycle to begin.

Enter a time within a 24 hour period: hr = 0–23, mn = 0–59. (Default = 00:00)



Sets the length of Time the exercise cycle will run.

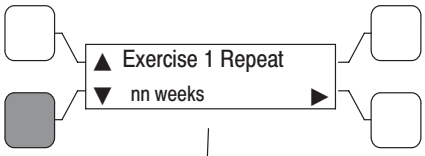
Enter a time within a 24 hour period: hr = 0–23, mn = 0–59. (Default = 00:00)



Sets an Interval the exercise cycle will repeat.

Enter a cycle between 0 and 52 weeks.

Typical values are 1 or 2. (Default = 0 weeks)



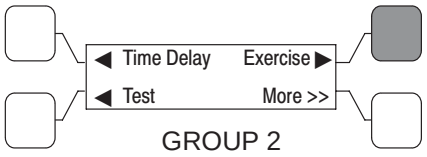
Note: Only one exercise is available for Level 1 Controllers

Continued on next page

FIGURE 4-23. SETUP GROUP 2 – EXERCISER SUB-MENUS (STARTING WITH SOFTWARE VERSION 1.5.190)

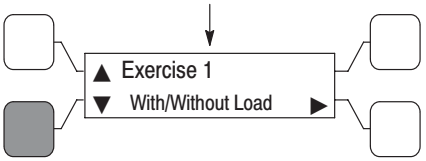
Setup – *Group 2*

Exercise Sub-Menus – Starting with Software Version 1.5.190 *(Continued)*



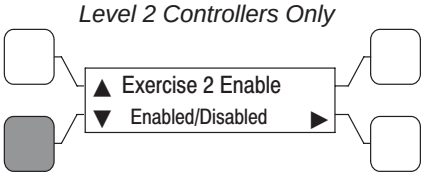
Level 2 Controllers allow for two exercise programs to be setup from the Setup menu screen. Six additional programs and eight exceptions can be setup using the PC Service Tool.

Continued from previous page

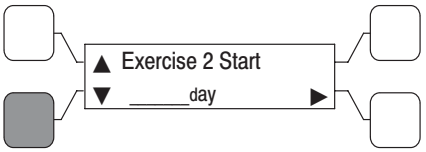


Enables or disables the first exercise program to run the generator(s) with or without a load. (Default = Without Load)

Level 2 Controllers Only

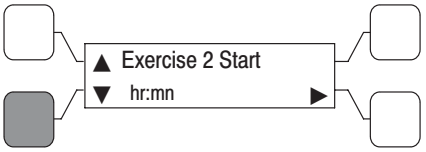


This screen allows disabling Exercise 2 only. (Default = Disabled)



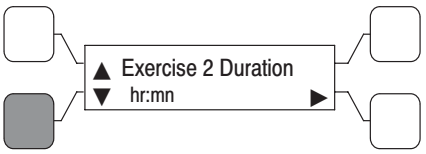
Sets the day of the second exercise cycle.

Enter a day between Sunday and Saturday. (Default = Sunday)



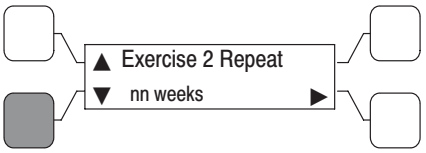
Sets the time the second exercise cycle will begin.

Enter a time within a 24 hour period: hr = 0–23, mn = 0–59. (Default = 00:00)



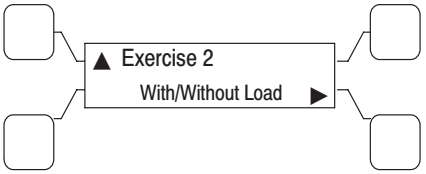
Sets a time limit the second exercise cycle will run.

Enter a time within a 24 hour period: hr = 0–23, mn = 0–59. (Default = 00:00)



Sets an Interval the second exercise cycle will repeat.

Enter a range from 0 to 52 weeks. Typical values are 1 or 2. (Default = 0 weeks)



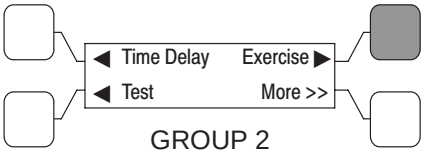
Enables or disables the second exercise program to run the generator(s) with or without a load. (Default = Without Load)

Add and Delete Exceptions
(continued on next page)

FIGURE 4-24. SETUP GROUP 2 – EXERCISER SUB-MENUS (STARTING WITH SOFTWARE VERSION 1.5.190) (Continued)

Setup – *Group 2*

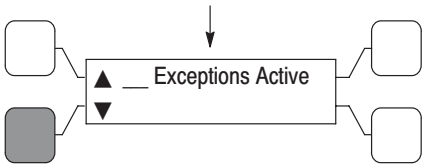
Exercise Exceptions Sub-Menus



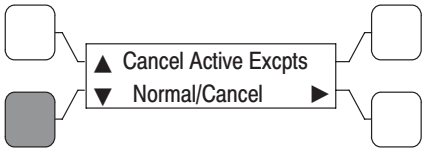
Level 2 Controllers allow for adding and deleting exceptions to the two exercise programs setup from the Setup menu screen.

Continued from previous page

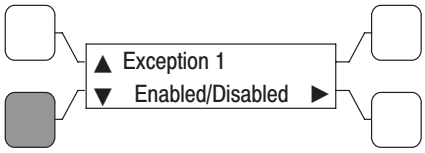
Indicates the number of active exercise exceptions. If there are no active exceptions, the message “No Exceptions Active” is displayed.



This screen allows canceling all exceptions. (Default = Normal)

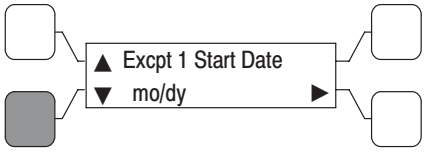


This screen allows enabling/disabling Exception 1 only. (Default = Disabled)



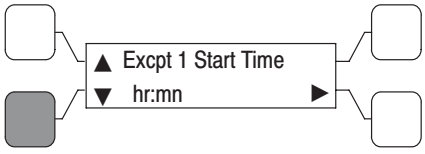
Sets the month and day for Exception 1.

Enter a starting date that the exercise will not run: mo = 1–12, dy = 1–31.



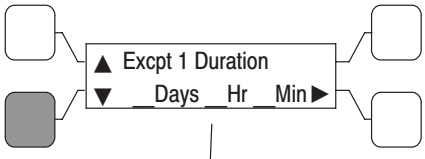
Sets a time of day for Exception 1.

Enter a starting time of day that the exercise will not run: hr = 0–23, mn = 0–59.



Sets the Time period that Exception 1 will override an Exercise.

Enter a time: dy = 1–31, hr = 0–23, mn = 0–59.

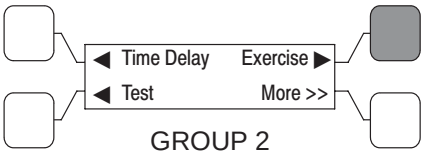


Continued on next page

FIGURE 4-25. SETUP GROUP 2 – EXERCISE EXCEPTIONS SUB-MENUS

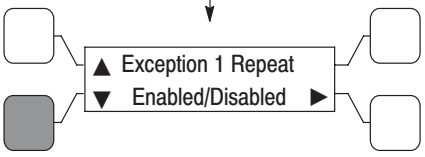
Setup – *Group 2*

Exercise Exceptions Sub-Menus *(Continued)*



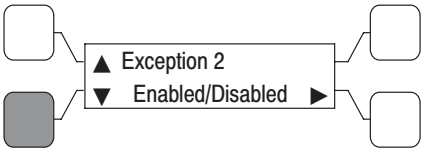
Continued from previous page

This screen allows enabling/disabling Exception 1 repeating. (Default = Disabled)



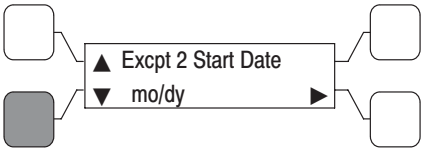
Level 2 Controllers Only

This screen allows enabling/disabling Exception 2 only. (Default = Disabled)



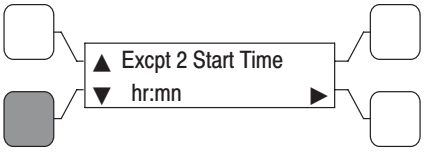
Sets the month and day for Exception 2.

Enter a starting date that the exercise will not run: mo = 1–12, dy = 1–31.



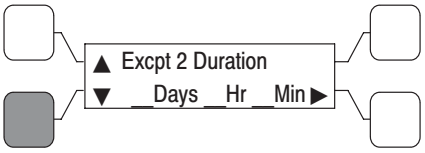
Sets a time of day for Exception 2.

Enter a starting time of day that the exercise will not run: hr = 0–23, mn = 0–59.



Sets the Time period that Exception 2 will override an Exercise.

Enter a time: dy = 1–31, hr = 0–23, mn = 0–59.



This screen allows enabling/disabling Exception 2 repeating. (Default = Disabled)

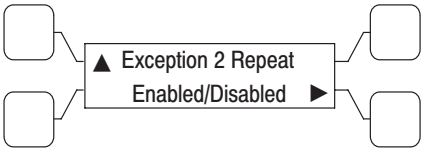


FIGURE 4-26. SETUP GROUP 2 – EXERCISE EXCEPTIONS SUB-MENUS (Continued)

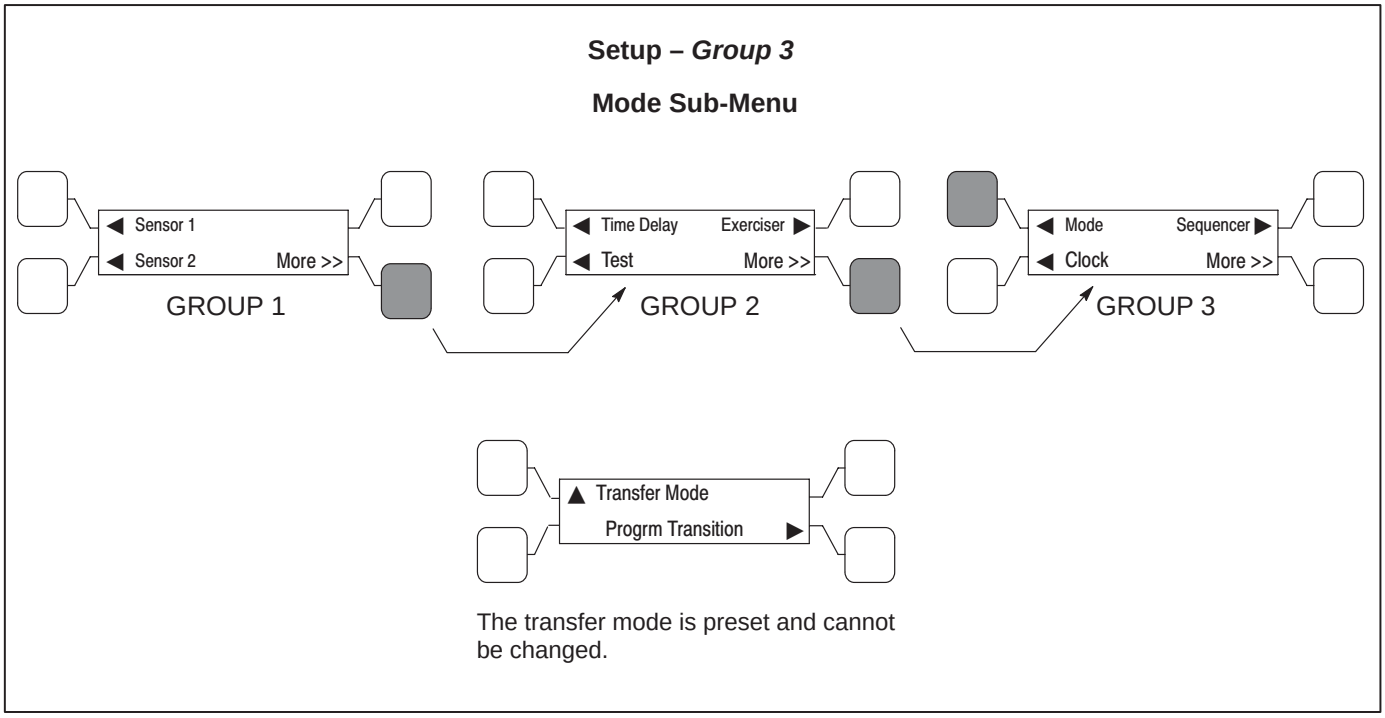
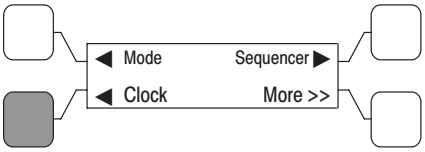


FIGURE 4-27. SETUP GROUP 3 – MODE SUB-MENU

Setup – *Group 3*

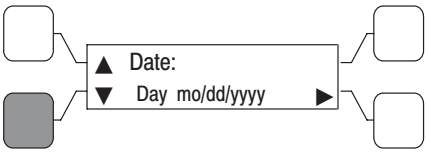
Clock Sub-Menus



The Clock sub-menus allow the user to set the actual date and-time, as well as select the Daylight Saving Time option.

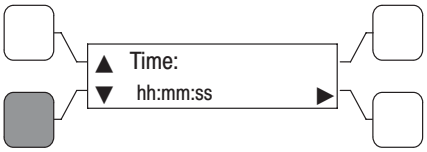
Sets the actual day and date.

Enter a month between Jan = 1 and Dec = 12, date between 1 and 31, and year between 1 and 9999.



Sets the actual time of day.

Enter the actual time within a 24 hour period Enter a time within a 24 hour period: hh = 0 – 23, mm = 0 – 59, ss = 0 – 59.



Activates the Daylight Savings time option. Selecting Enabled automatically updates the clock +/– one hour on the appropriate days. (Default = Disabled)

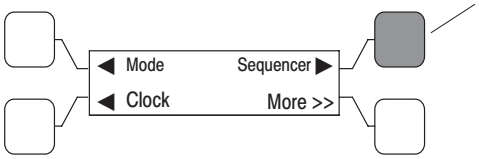
Note: The Daylight Savings Time program is set for North America. If you are anywhere outside of North America, the time should be changed manually.

- The first Sunday in April – moves the time forward one hour.
- The last Sunday in October – moves the time back one hour.

FIGURE 4-28. SETUP GROUP 3 – CLOCK SUB-MENUS

Setup – *Group 3*

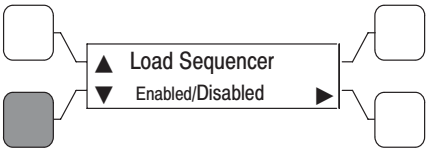
Sequencer Sub-Menus



The Sequencer sub-menus are a software only feature allowing the user to send a predetermined sequence of network event announcements. The announcements are sent in a timed, sequential order and are used to turn ATS loads off and on.

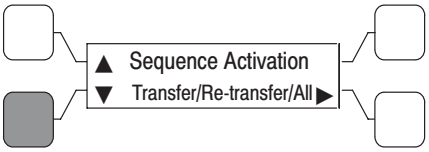
Sequencer is available only with the Network Communication Module. The module must be installed and enabled before these screens are displayed.

When Enabled, allows event announcements to be sent to the transfer switch.



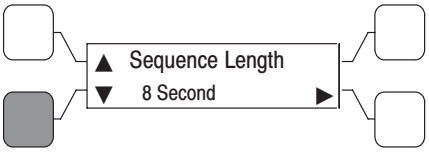
Sets activation for certain operational modes.

Choose Transfer, Re-transfer or All



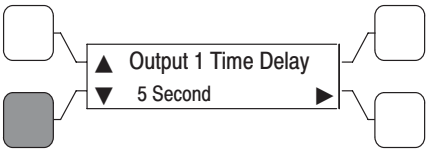
The control can activate a maximum of 8 relay output signals.

Enter the number of relay output signals desired to activate: 1 thru 8



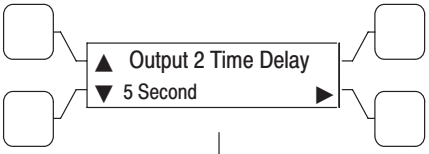
When Load Sequencer is triggered, the controller deactivates all remote relay output signals. Starting with Relay 1, the controller counts down the specified time delay, then activates Relay 1.

Enter a time from 0 to 60 seconds.



If the Sequence Length is greater than 1, the control counts down the specified Relay 2 time delay, then activates the Relay 2 signal.

Enter a time from 0 to 60 seconds.



The process repeats until all relay signals have been sequenced. The maximum time delay for all 8 signals is 8 minutes.

Menus continue through Output 8, depending on the number of Sequence Lengths specified.

FIGURE 4-29. SETUP GROUP 3 – SEQUENCER SUB-MENUS

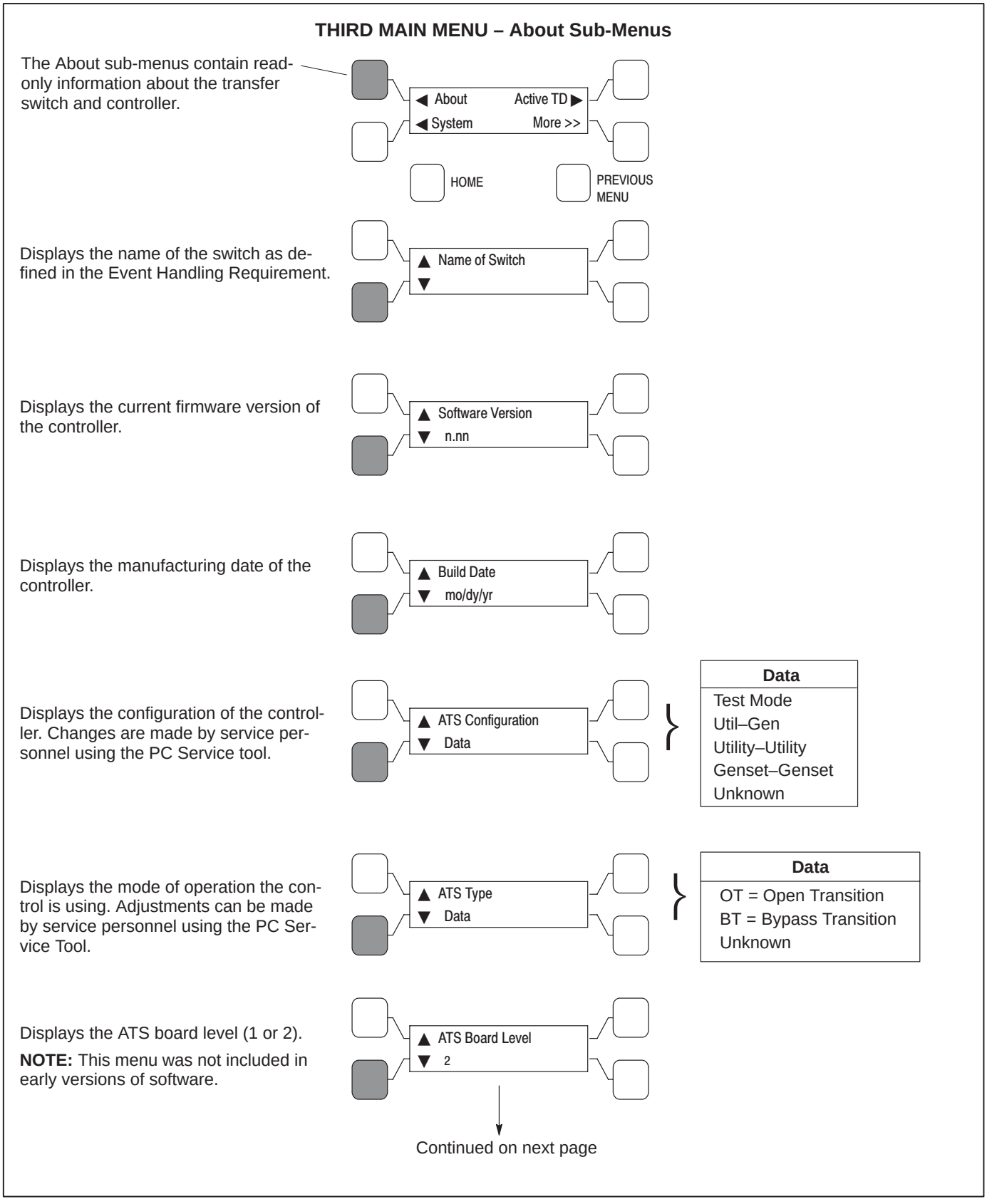
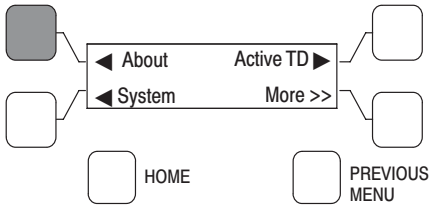


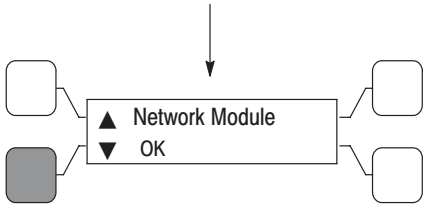
FIGURE 4-30. THIRD MAIN MENU – ABOUT SUB-MENUS

THIRD MAIN MENU – About Sub-Menus *(continued)*



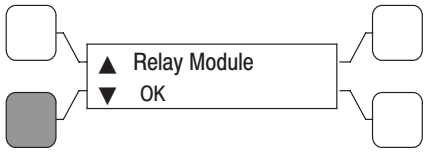
Continued from previous page

This screen indicates if a Network Communications Module is installed and enabled.



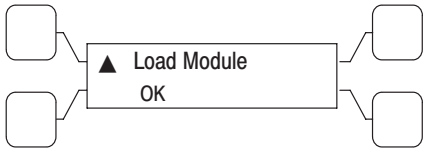
Hardware Detected	Software Enabled	Data
True	True	OK
False	True	Not Installed
True	False	Not Enabled
False	False	Not Available

This screen indicates if the Relay Module hardware is installed.



This screen indicates if the Load Current Module hardware is installed.

This feature is not available on Level 1 controllers

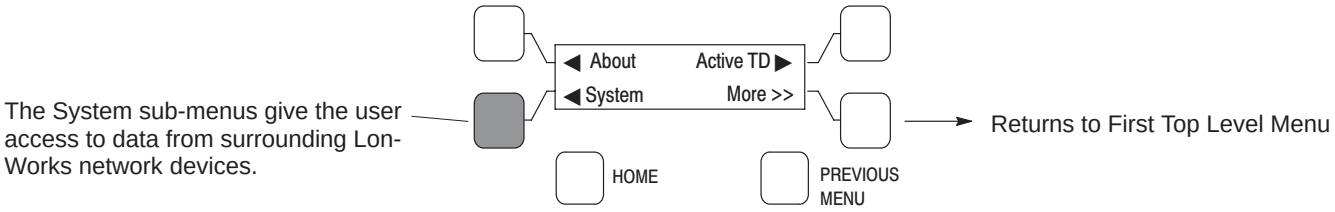


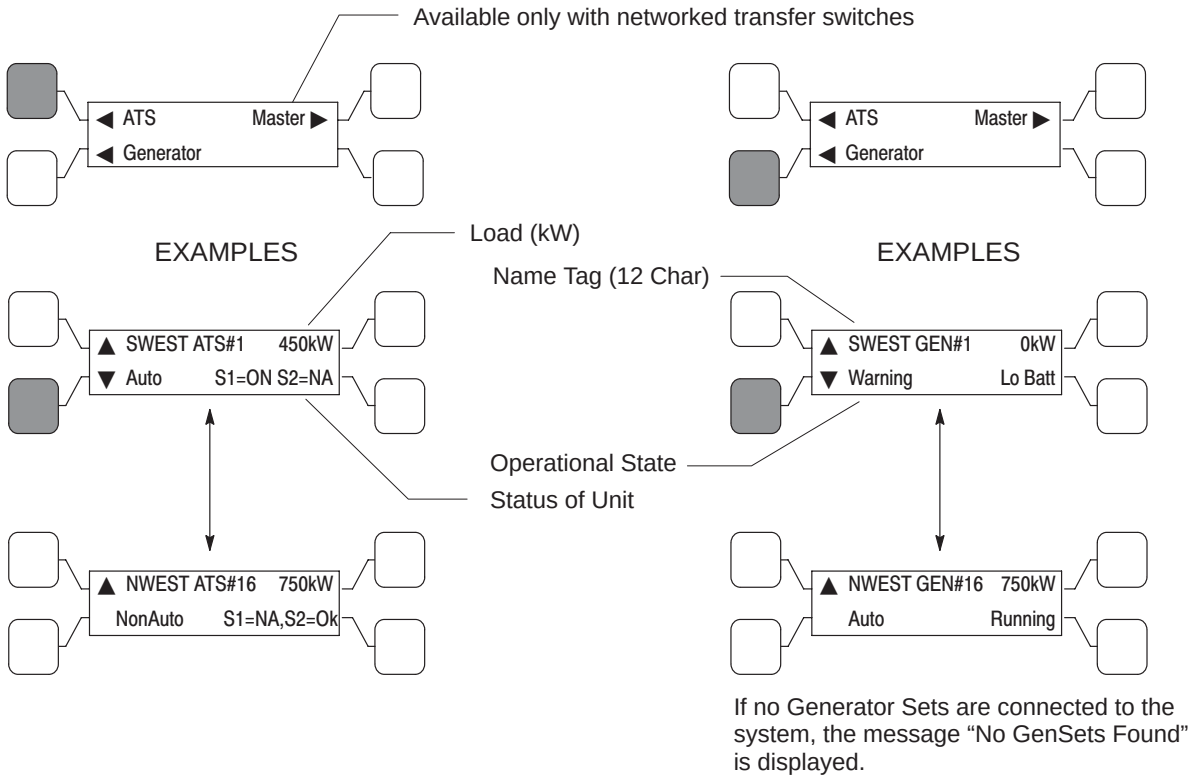
Data
OK
Not Installed

FIGURE 4-31. THIRD MAIN MENU – ABOUT SUB-MENUS (Continued)

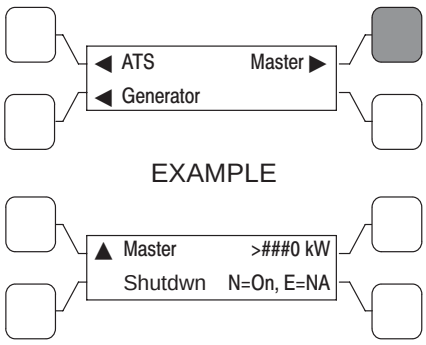
THIRD MAIN MENU – System Sub-Menus

These sub-menus are available only with the Network Communication Module.
The status of up to 32 devices can be viewed at the ATS.





If no Generator Sets are connected to the system, the message “No GenSets Found” is displayed.



The Master Control menu displays information on:

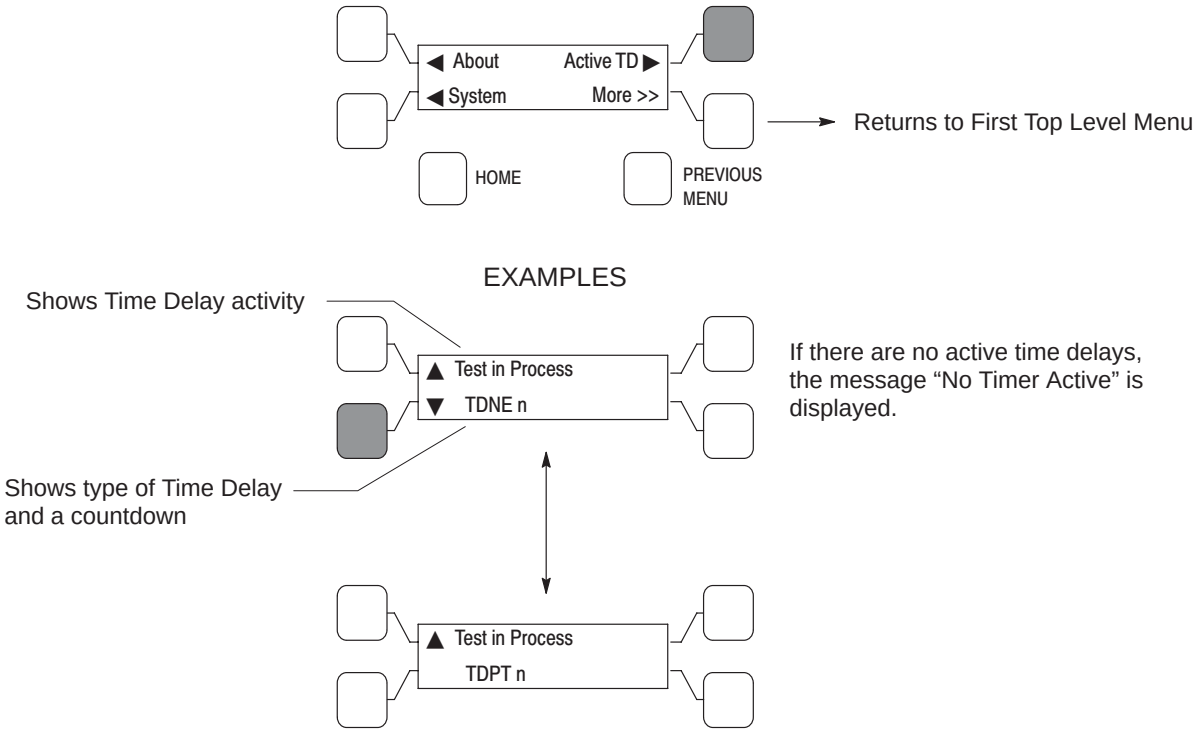
1. Power (kW)
2. Master Control Status
   (Non Auto, Ready, Norm Fail, Test)
3. Voltage Source Status
   ([N=Source1, E=Source2], On, OK, or NA).

If a Master Control is not connected to the system, the message “No Master Control” is displayed.

NOTE: The Master Control menu is not available in early versions of software.

FIGURE 4-32. THIRD MAIN MENU – SYSTEM SUB-MENUS

THIRD MAIN MENU – Active TD Sub-Menus



NOTE: Active TD menus were not available on early versions of software.

FIGURE 4-33. THIRD MAIN MENU – ACTIVE TD SUB-MENUS

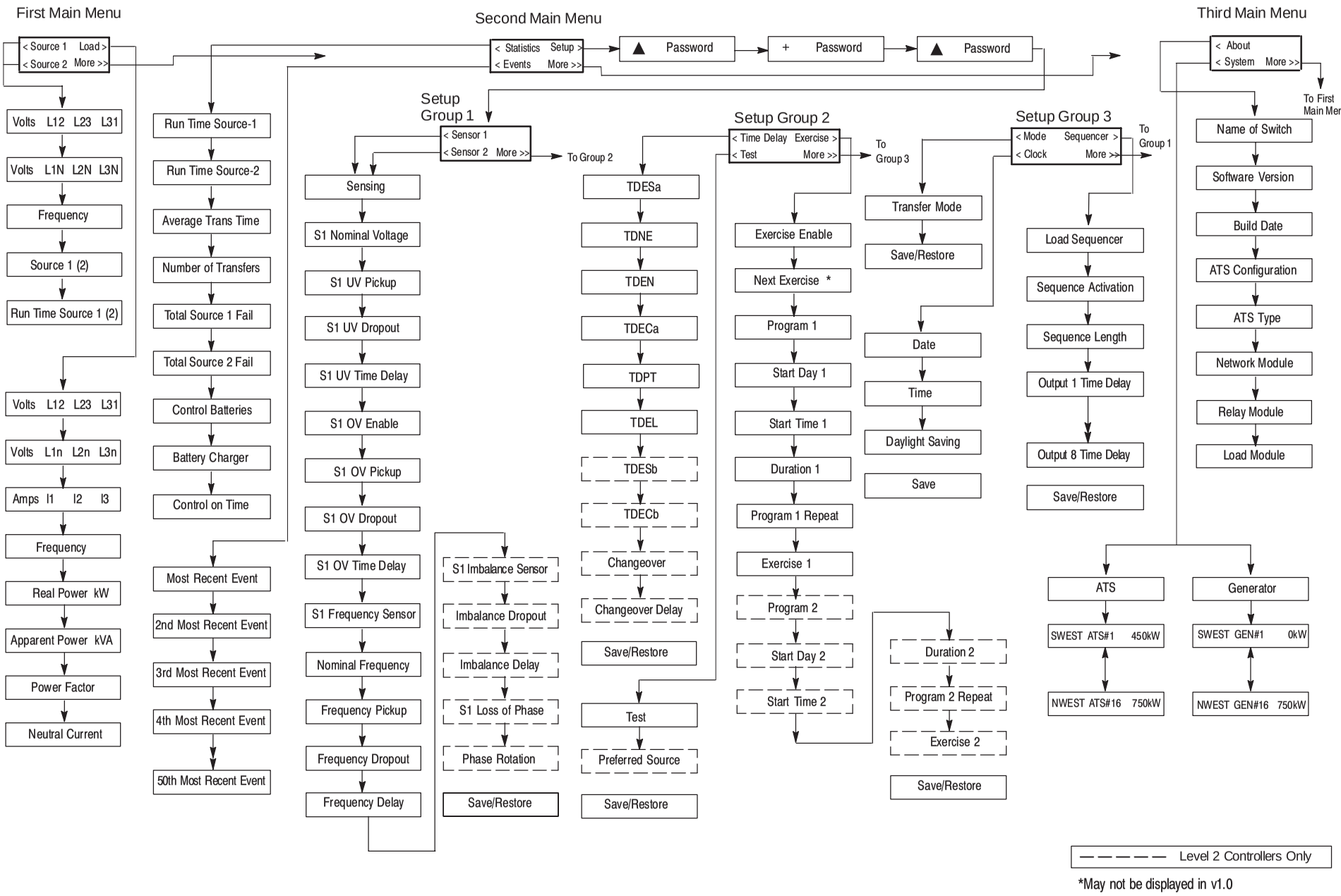


FIGURE 4-34. MENU SYSTEM MAP – PRIOR TO SOFTWARE VERSION 1.5.190

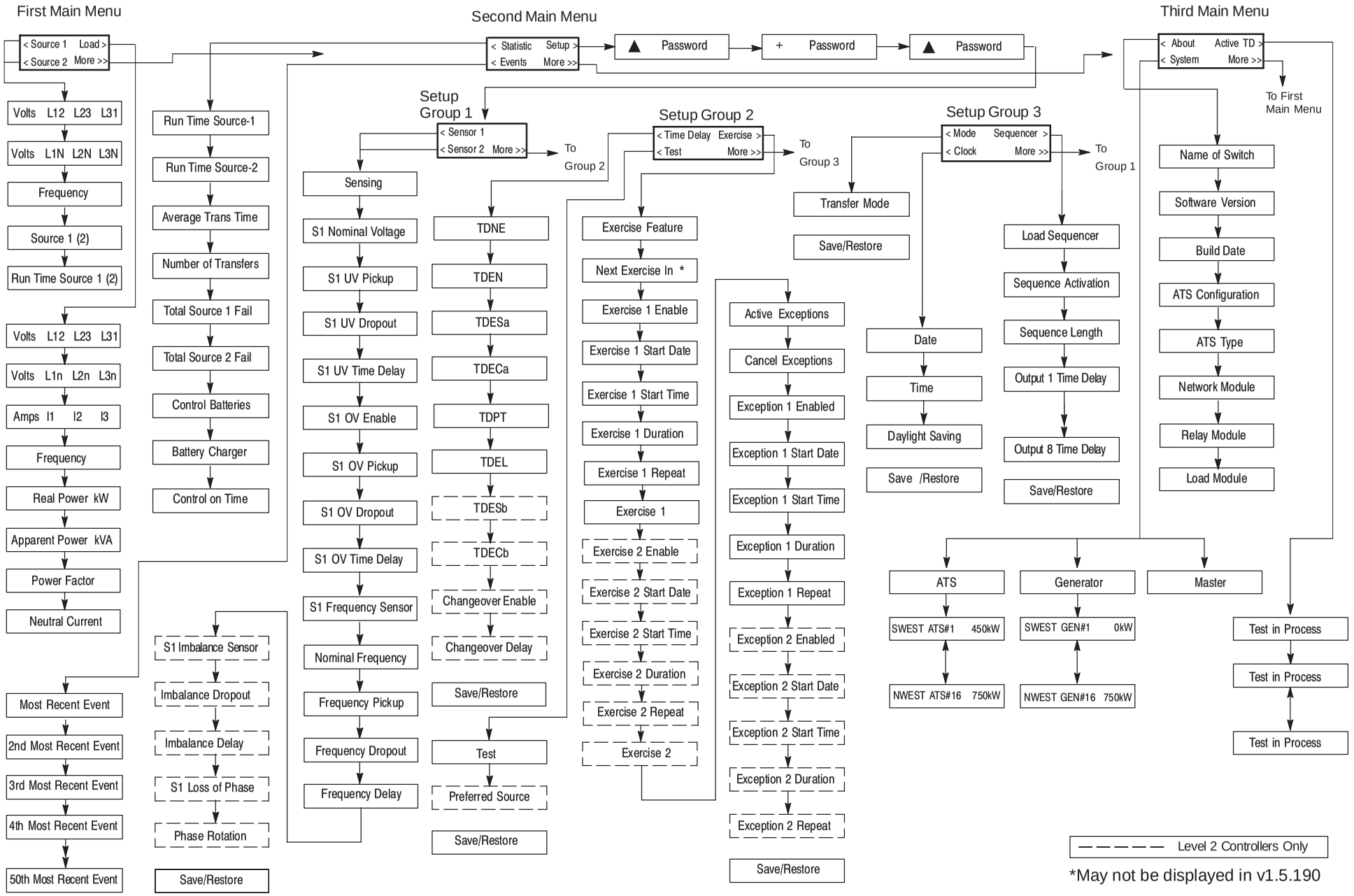


FIGURE 4-35. MENU SYSTEM MAP – STARTING WITH SOFTWARE VERSION 1.5.190

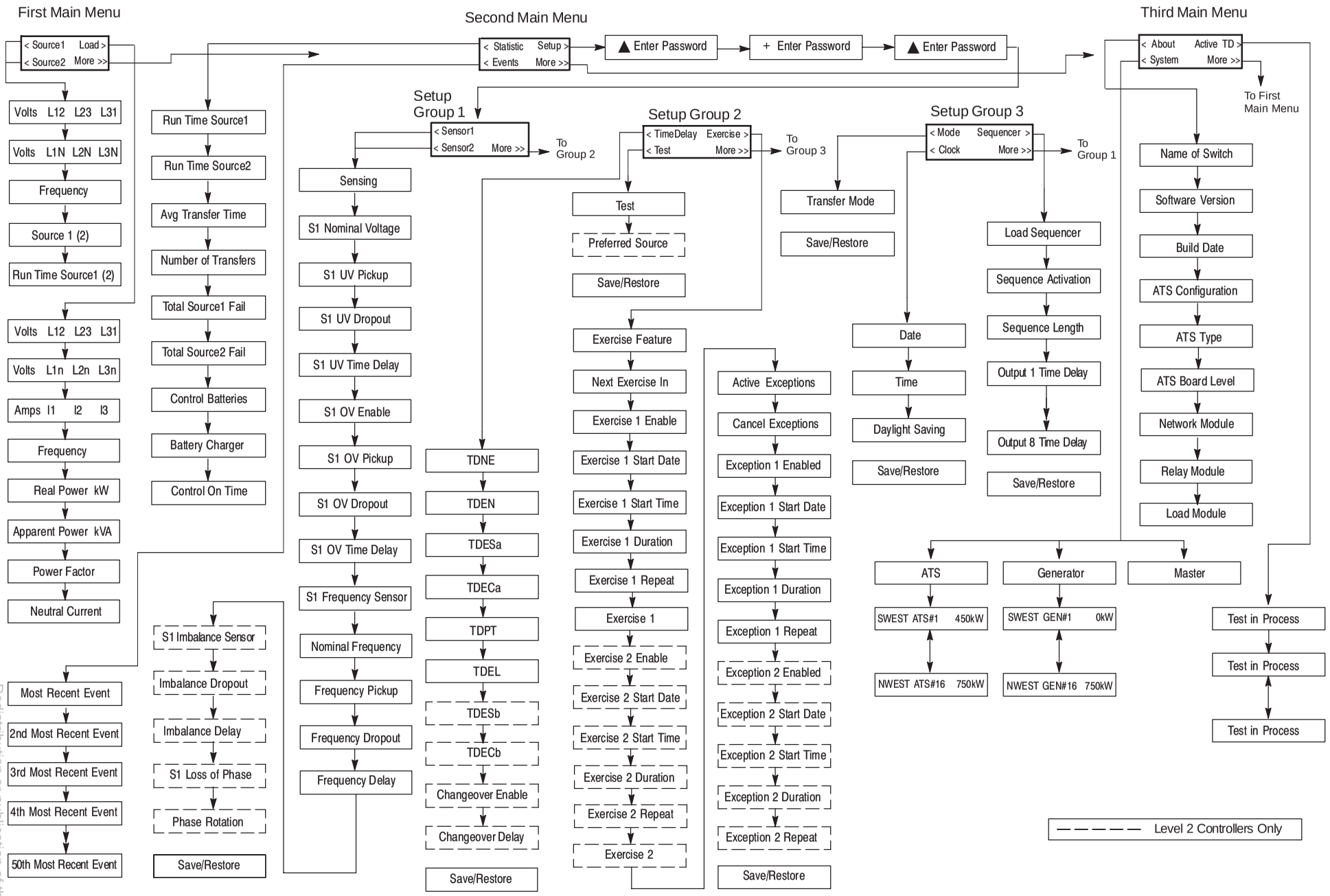


FIGURE 4-36. MENU SYSTEM MAP – STARTING WITH SOFTWARE VERSION 1.8.204

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5. Checkout

If the transfer switch is equipped with a Digital Display, use it to checkout the switch. Refer to Section 4 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.

   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 genset exercising.

CONTROL LED INDICATORS AND 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.

Exerciser Enable/Disable Switch

The Exerciser Enable/Disable switch (Figure 5-1) enables the control to exercise the genset 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.

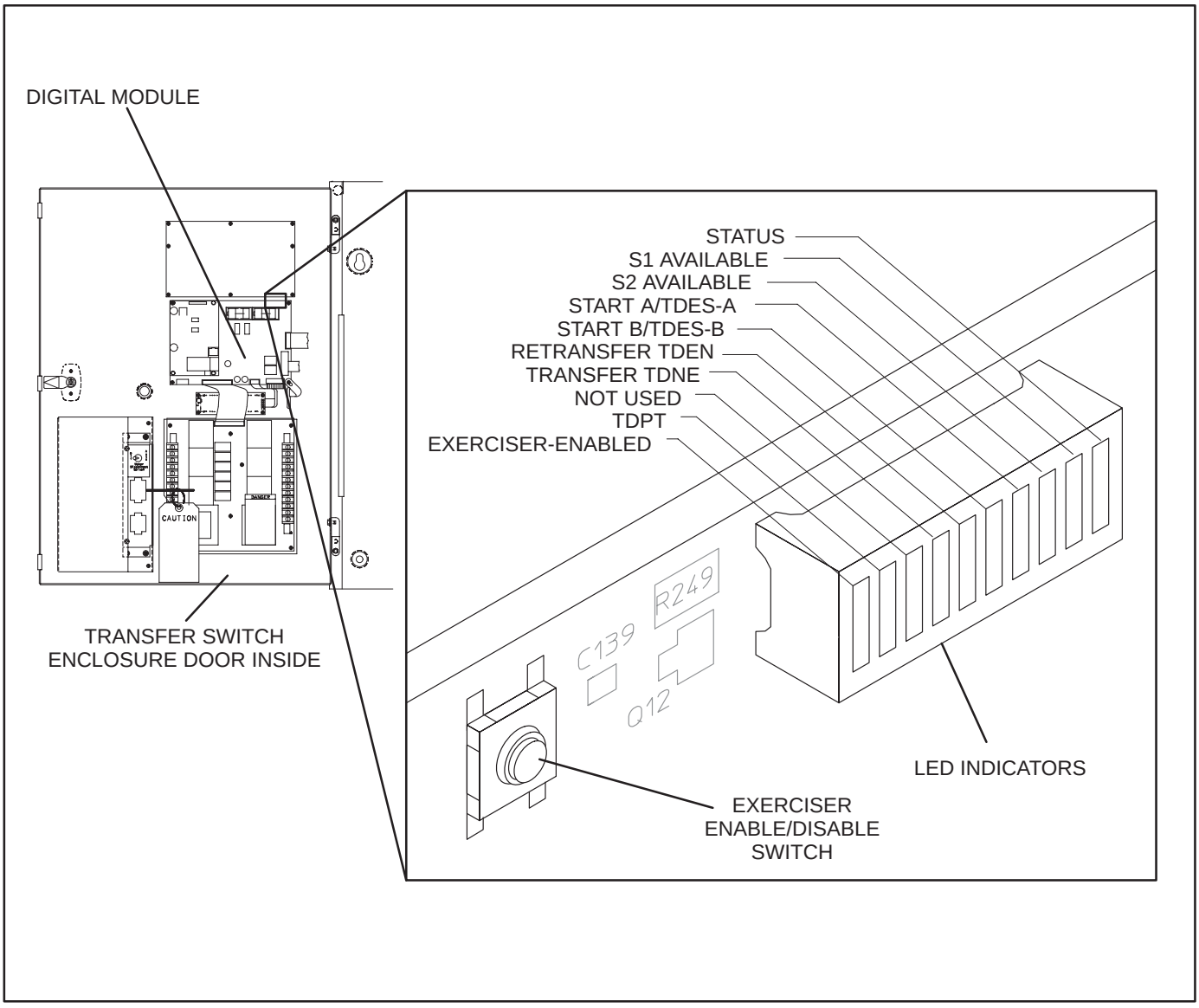

FIGURE 5-1. LED LOCATION ON DIGITAL MODULE (SHOWN ON THE 40 TO 125 AMP SWITCH)

TABLE 5-1. DIGITAL MODULE LED INDICATORS

Indicator	Definition
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	1. Lights constantly when the control has commanded Source 2 to start 2. Blinks at 1/2 Hz rate during the time delay to engine start (TDESa)
Start B/TDES-B	This indicator is only used for genset-to-genset applications when Source 1 is a generator not a utility. 1. Lights constantly when the control has commanded Source 1 to start 2. Blinks at 1/2 Hz rate during the time delay to engine start (TDESb)
Retransfer/TDEN	1. Lights when the control energizes the Retransfer relay 2. Blinks at 1/2 Hz rate during the time delay to retransfer (TDEN)
Transfer/TDNE	1. Lights when the control energizes the Transfer relay 2. Blinks at 1/2 Hz rate during the time delay to transfer (TDNE)
TDPT	Time Delay Programmed Transition Blinks at 1/2 Hz rate during the programmed transition time delay
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 your transfer switch *Installation Manual*.

☐ For Level 2 controls with 3-wire, 3-phase Delta applications, refer to the *Installation Manual* 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 sub-menu 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*. Exercise exceptions can be cancelled in the “Cancl Active Excpts” sub-menu (change from “Normal” to “Cancel”).

Setting the Unit to Test With or Without Load

☐ Navigate to the Test sub-menu 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 sub-menus, 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” sub-menu 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 the transfer switch *Installation 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.

InPower is a trademark of Onan Corporation.

⚠ 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 your transfer switch *Installation 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 genset 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.

7. Schematics

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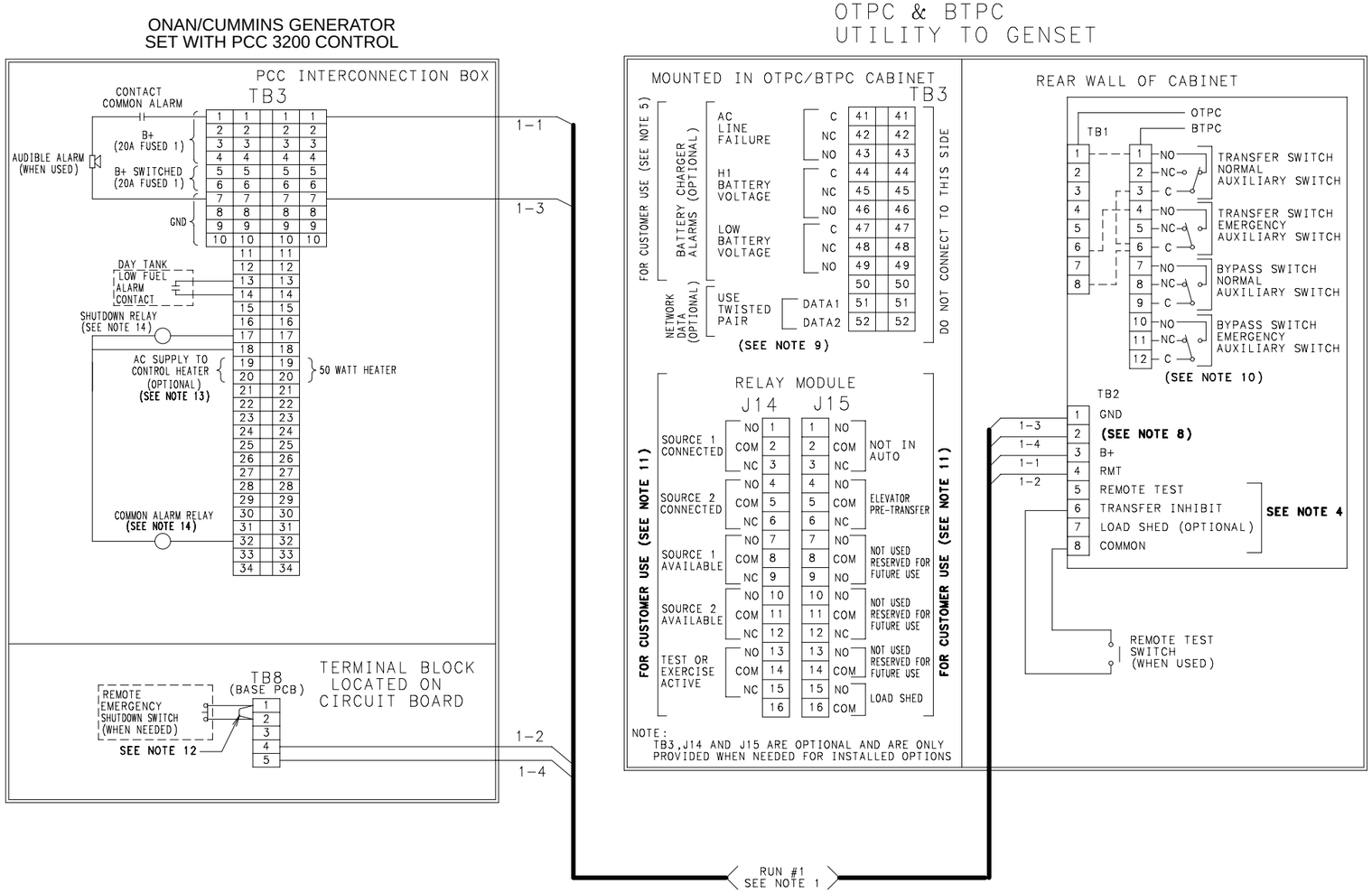
Cummins Power Generation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
1-800-888-6626
763-574-5000 International Use
Fax: 763-528-7229

Power Generation

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.



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

NOTES:

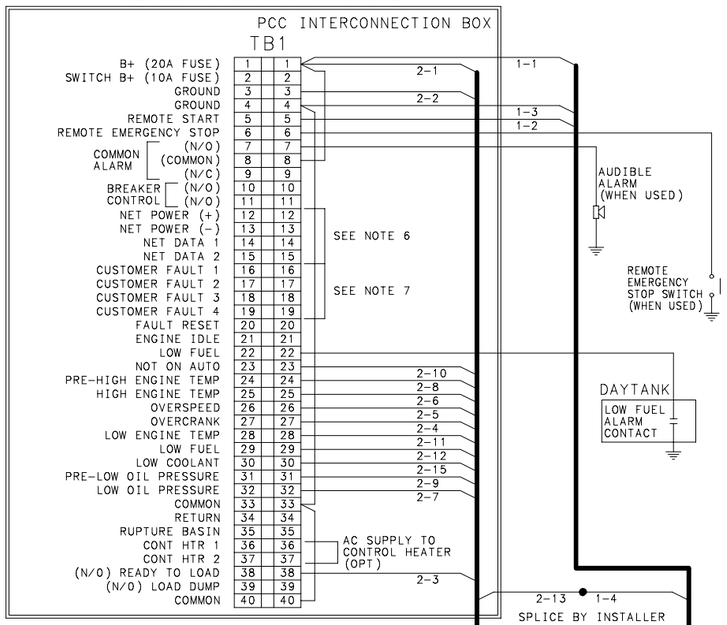
1. WIRE SIZES MUST BE AS FOLLOWS:
   RUN #1–GENSET TO TRANSFER SWITCH–LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.
   WITH NO BATT CHARGER–LEADS 1–1, –2, –3, –4, –5 USE COL A
   WITH 2 AMP CHARGER–LEADS 1–1 & 1–3, USE COL. B
   WITH 10 AMP CHARGER–LEADS 1–1 & 1–3, USE COL. C
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. 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 900–0366 (TP–78 NETWORKS) OR 900–0529 (FT–10 NETWORKS) POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL FOR WIRING INSTRUCTIONS.
7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
8. ON PCC 3200 CONTROLS, NO JUMPER IS REQUIRED BETWEEN TB1–1 & TB1–2.
9. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
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.
    THE JUMPER SHOWN BETWEEN TB8–1 AND TB8–2 IS NOT SUPPLIED WITH UNIT.
13. 120VAC OR 240VAC AT 50W.
14. CUSTOMER SUPPLIED EITHER 12 OR 24VDC RELAYS OUTPUT SIGNAL 20ma @ 24VDC MAX.

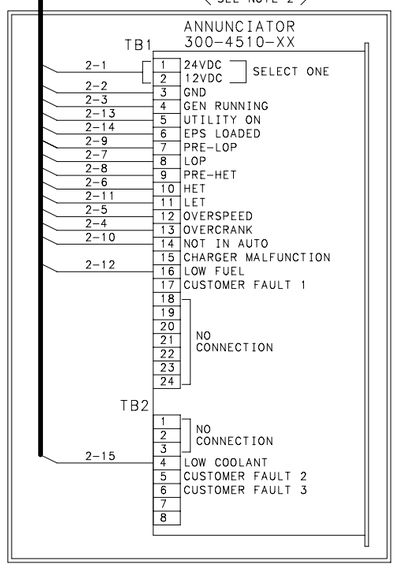
No. 630-1974 Sh 1 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 1 OF 6)

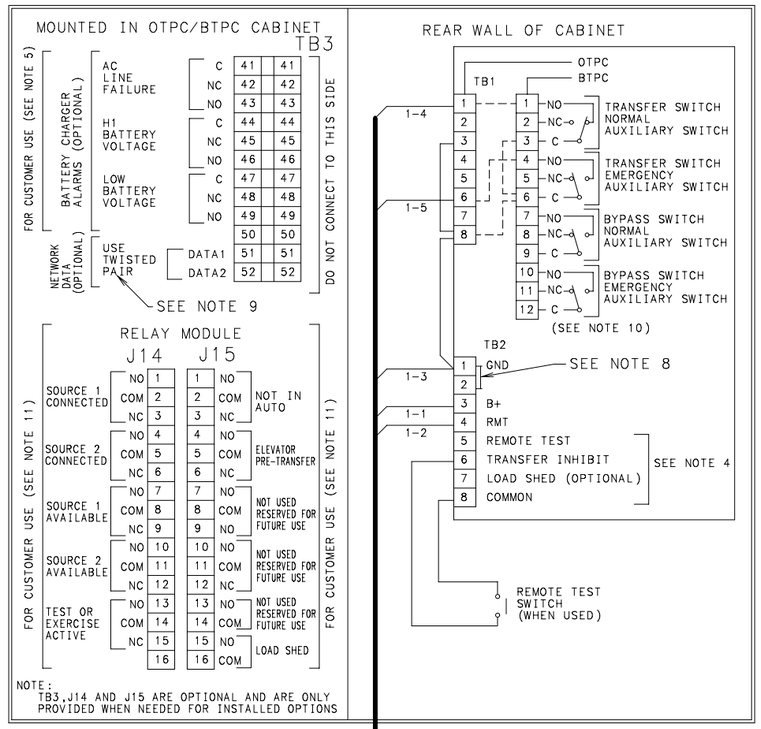
THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.

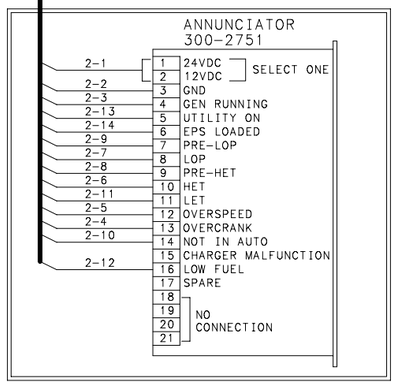
ONAN/CUMMINS GENERATOR SET WITH PCC 3100 CONTROL





OTPC & BTPC UTILITY TO GENSET





WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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. 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 900-0366 (TP-78 NETWORKS) OR 900-0529 (FT-10 NETWORKS) POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL FOR WIRING INSTRUCTIONS.
7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
8. INSTALL JUMPER BETWEEN TB1–1 & TB1–2 FOR SETS WITH PCC 3100 CONTROL.
9. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
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.

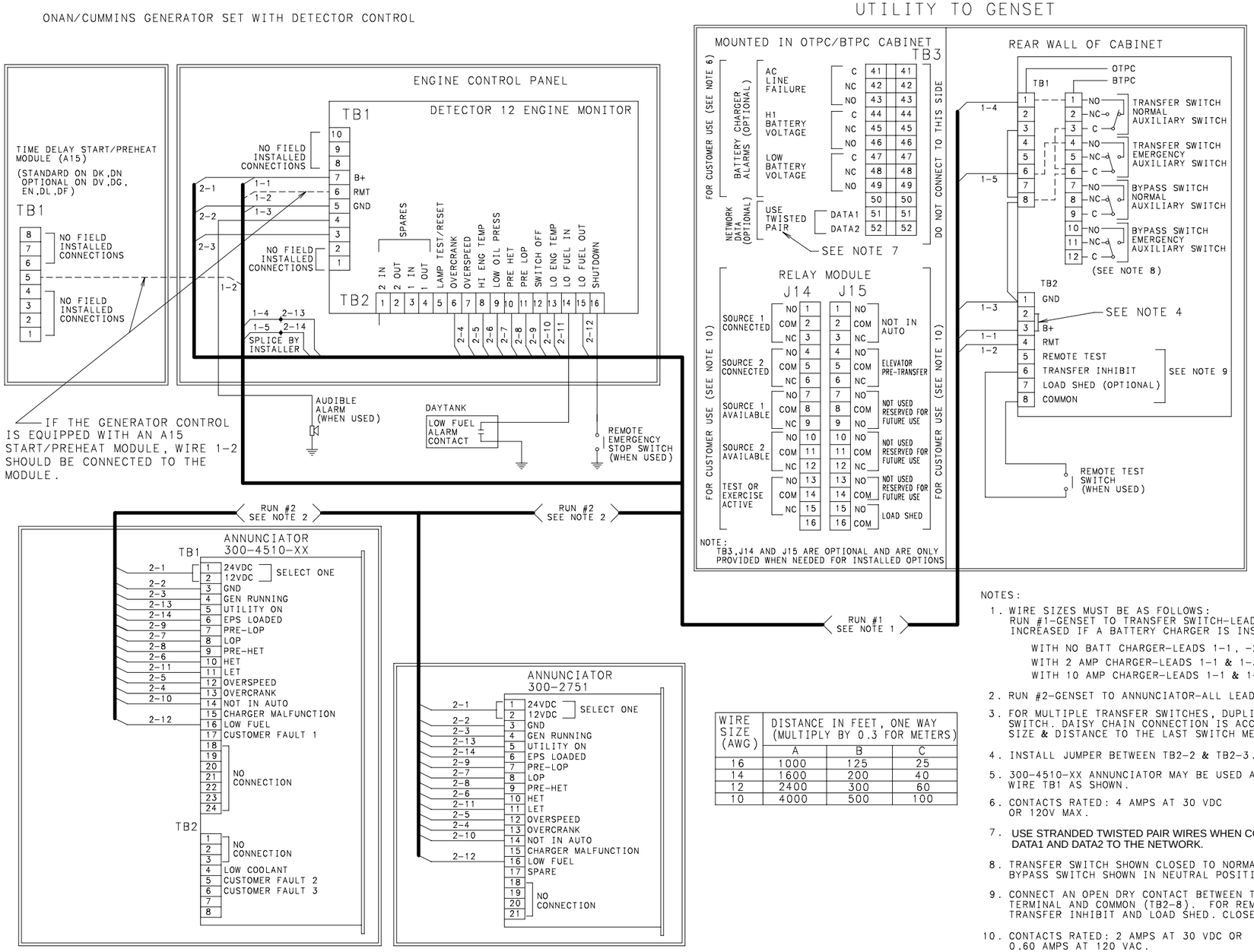
No. 630-1974 Sh 2 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 2 OF 6)

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.

ONAN/CUMMINS GENERATOR SET WITH DETECTOR CONTROL

OTPC & BTPC
UTILITY TO GENSET



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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 TB1 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.

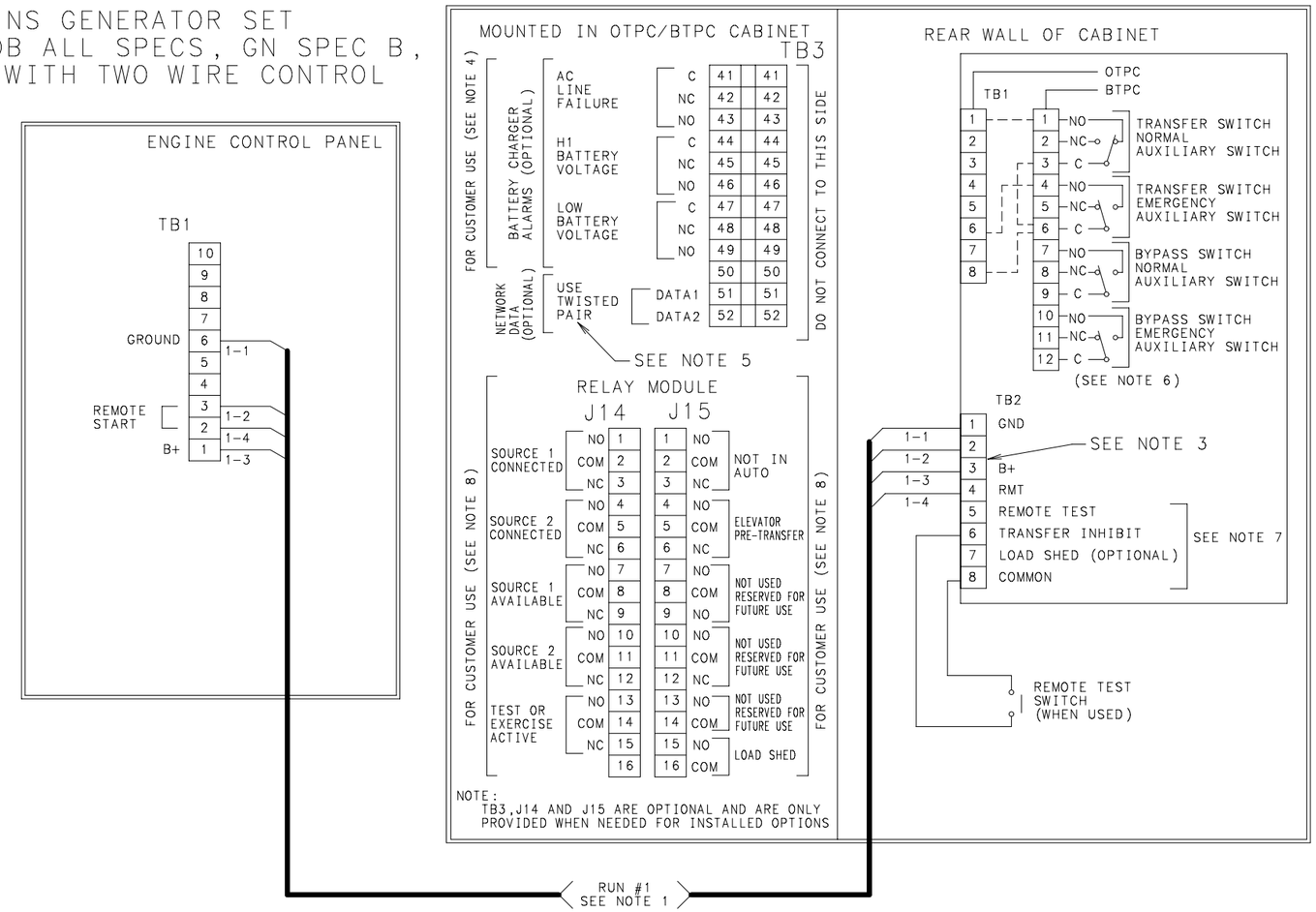
No. 630-1974 Sh 3 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 3 OF 6)

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

ONAN/CUMMINS GENERATOR SET
SERIES GGDB ALL SPECS, GN SPEC B, DN SPEC B WITH TWO WIRE CONTROL



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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 1-2, -4 USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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.

No. 630-1974 Sh 4 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

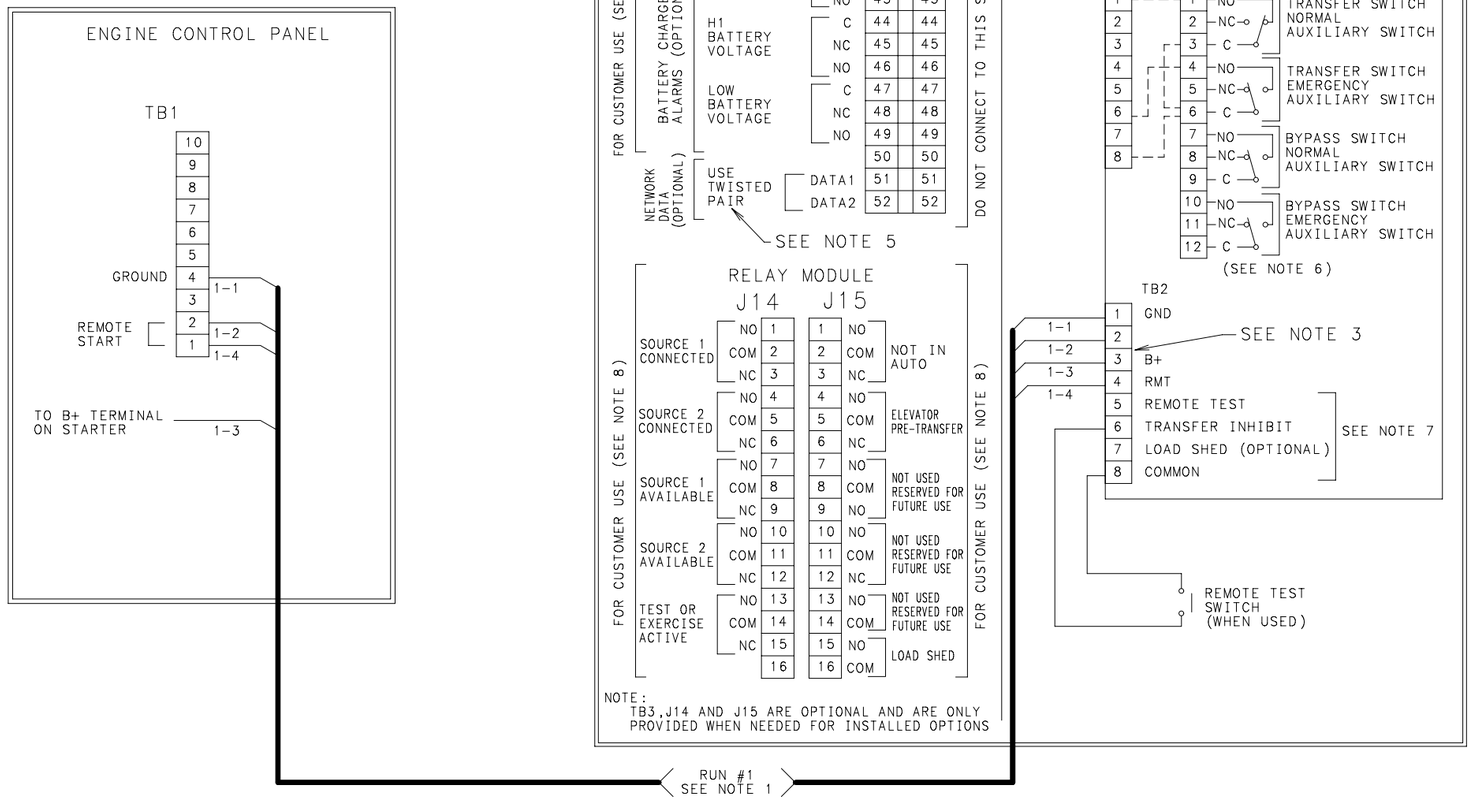
40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 4 OF 6)

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.

ONAN/CUMMINS GENERATOR SET

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

OTPC & BTPC
UTILITY TO GENSET



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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 1-2, -4 USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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.

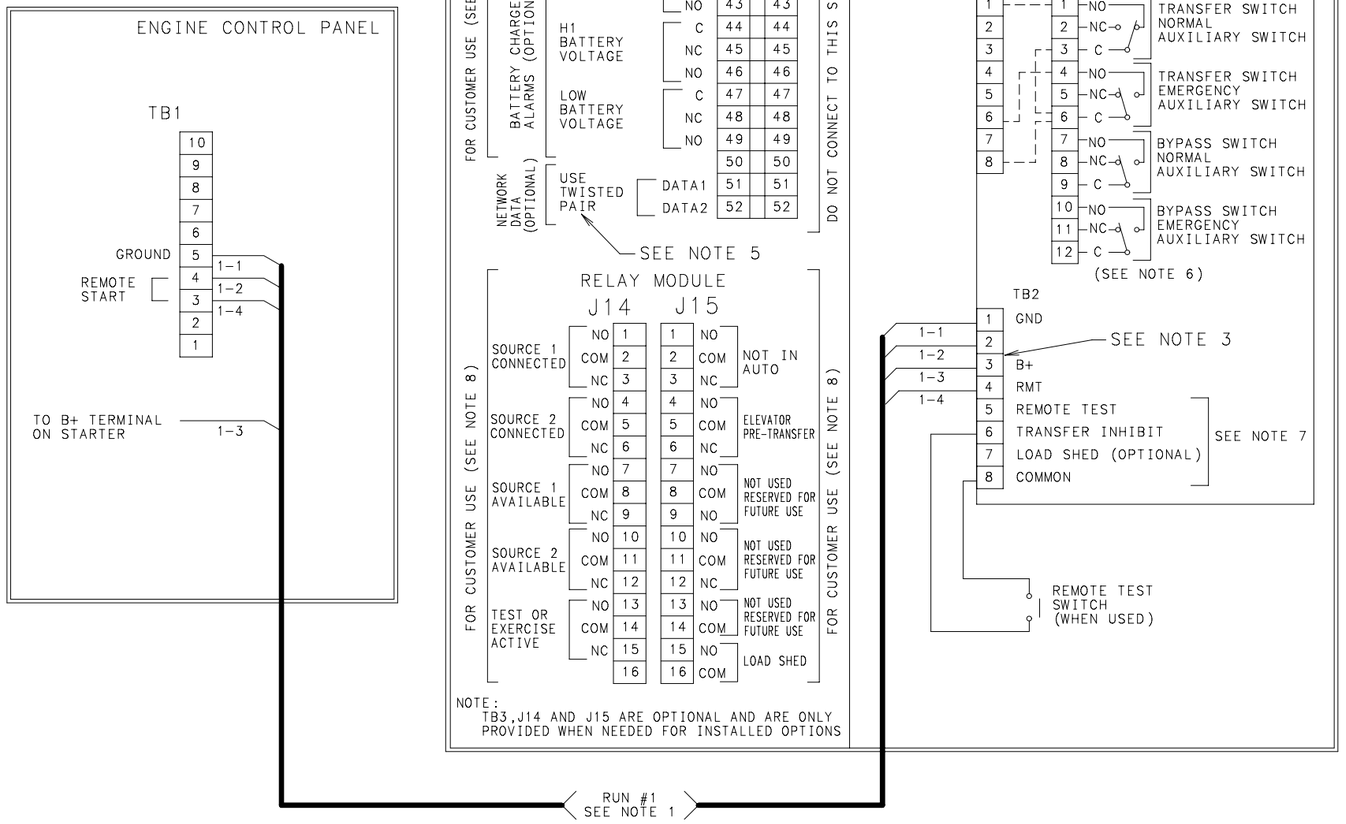
No. 630-1974 Sh 5 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 5 OF 6)

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.

ONAN/CUMMINS GENERATOR SET SERIES DG, GGFB, GGFC, GGHB, GGHC, GGHD WITH TWO WIRE CONTROL

OTPC & BTPC UTILITY TO GENSET



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

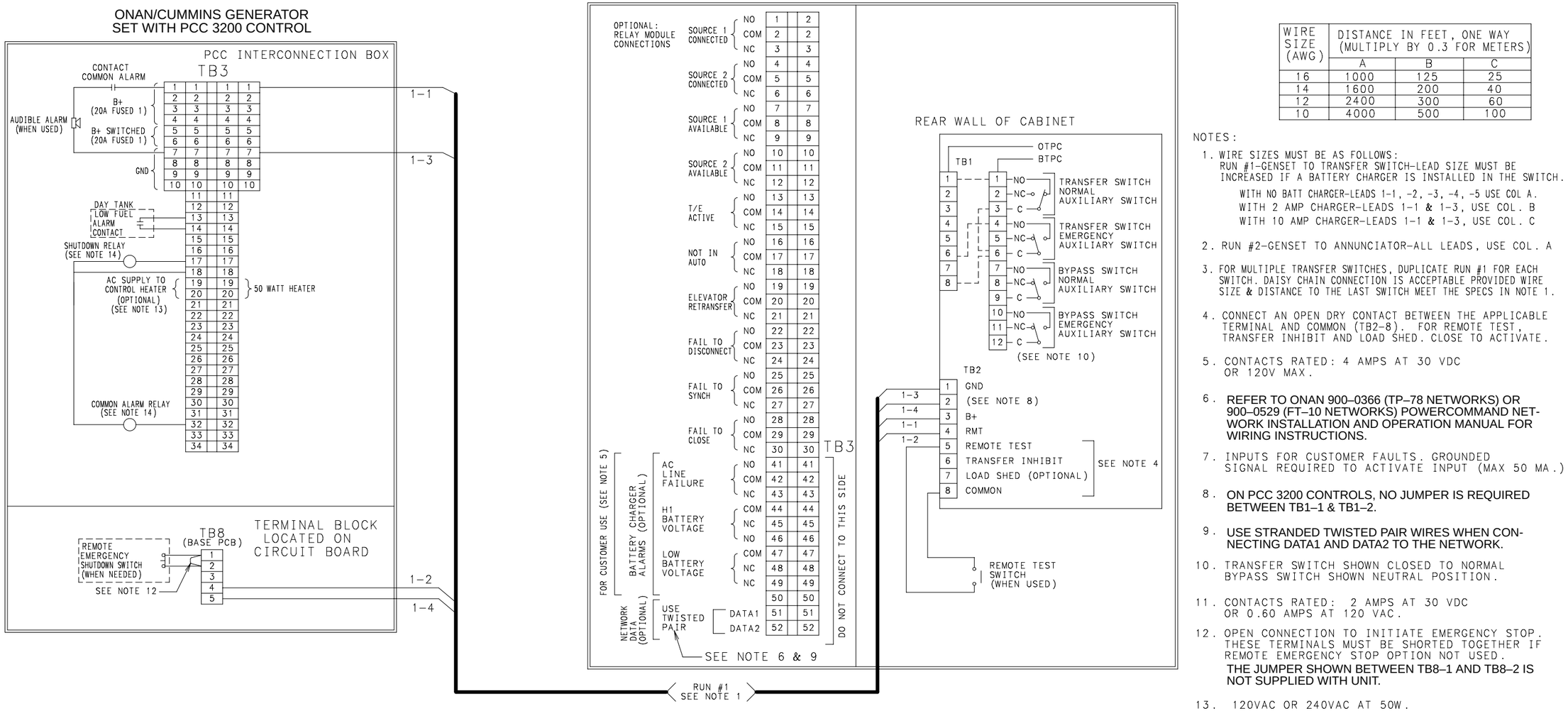
NOTES:

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 1-2, -4, USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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.

No. 630-1974 Sh 6 of 6
Rev. D, Mod Sys: Revisio
Modified 2/2000

40 – 1000 AMP TYPICAL INTERCONNECTION DIAGRAM (SHT 6 OF 6)

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.



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

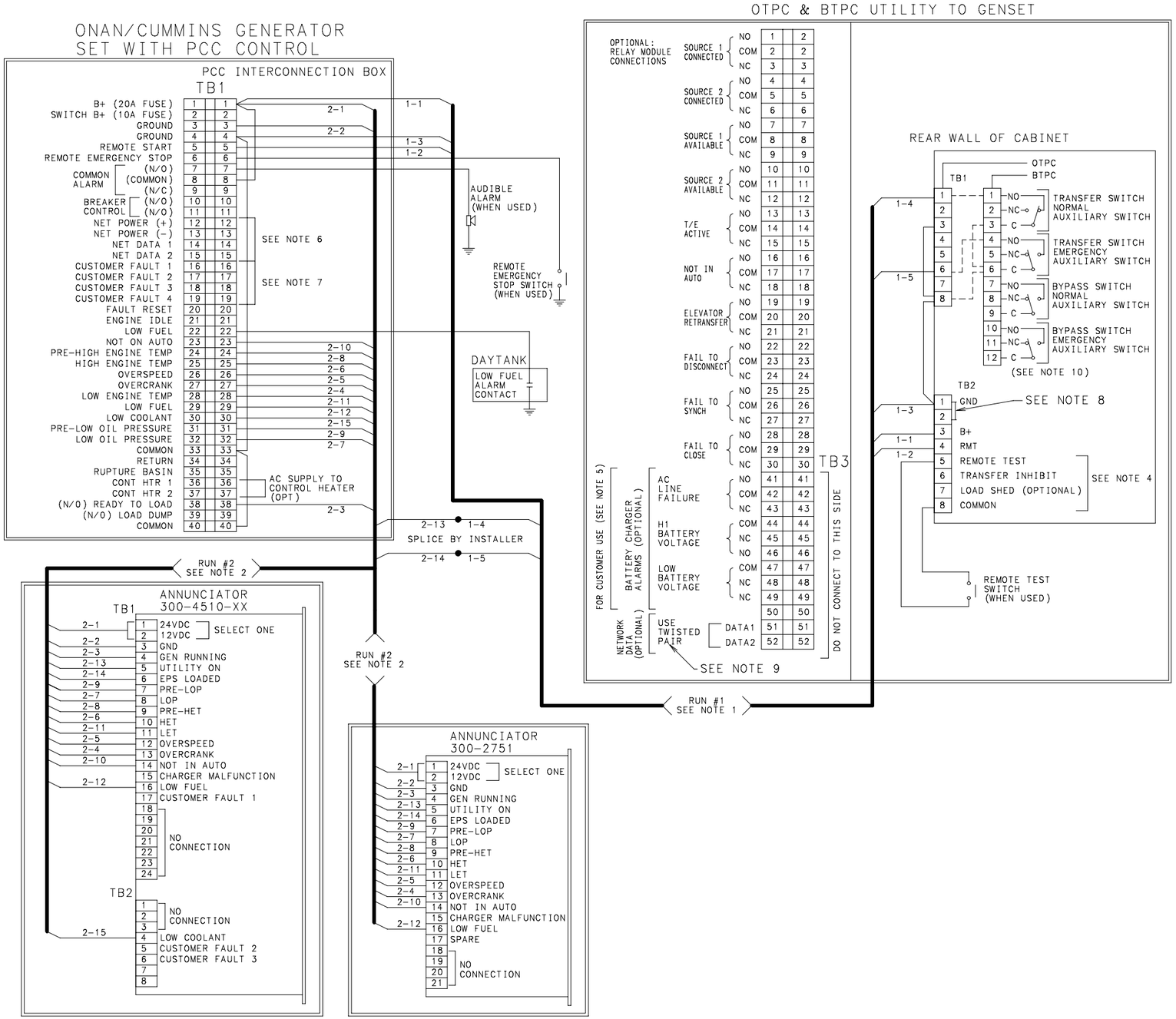
NOTES:

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–LEADS 1–1 & 1–3, USE COL. B
   WITH 10 AMP CHARGER–LEADS 1–1 & 1–3, USE COL. C
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. 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 900–0366 (TP–78 NETWORKS) OR 900–0529 (FT–10 NETWORKS) POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL FOR WIRING INSTRUCTIONS.
7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
8. ON PCC 3200 CONTROLS, NO JUMPER IS REQUIRED BETWEEN TB1–1 & TB1–2.
9. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
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.
    THE JUMPER SHOWN BETWEEN TB8–1 AND TB8–2 IS NOT SUPPLIED WITH UNIT.
13. 120VAC OR 240VAC AT 50W.
14. CUSTOMER SUPPLIED EITHER 12 OR 24VDC RELAYS OUTPUT SIGNAL 200ma @24VDC MAX.

No. 630-2018 Sh 1 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 1 OF 6)

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.



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

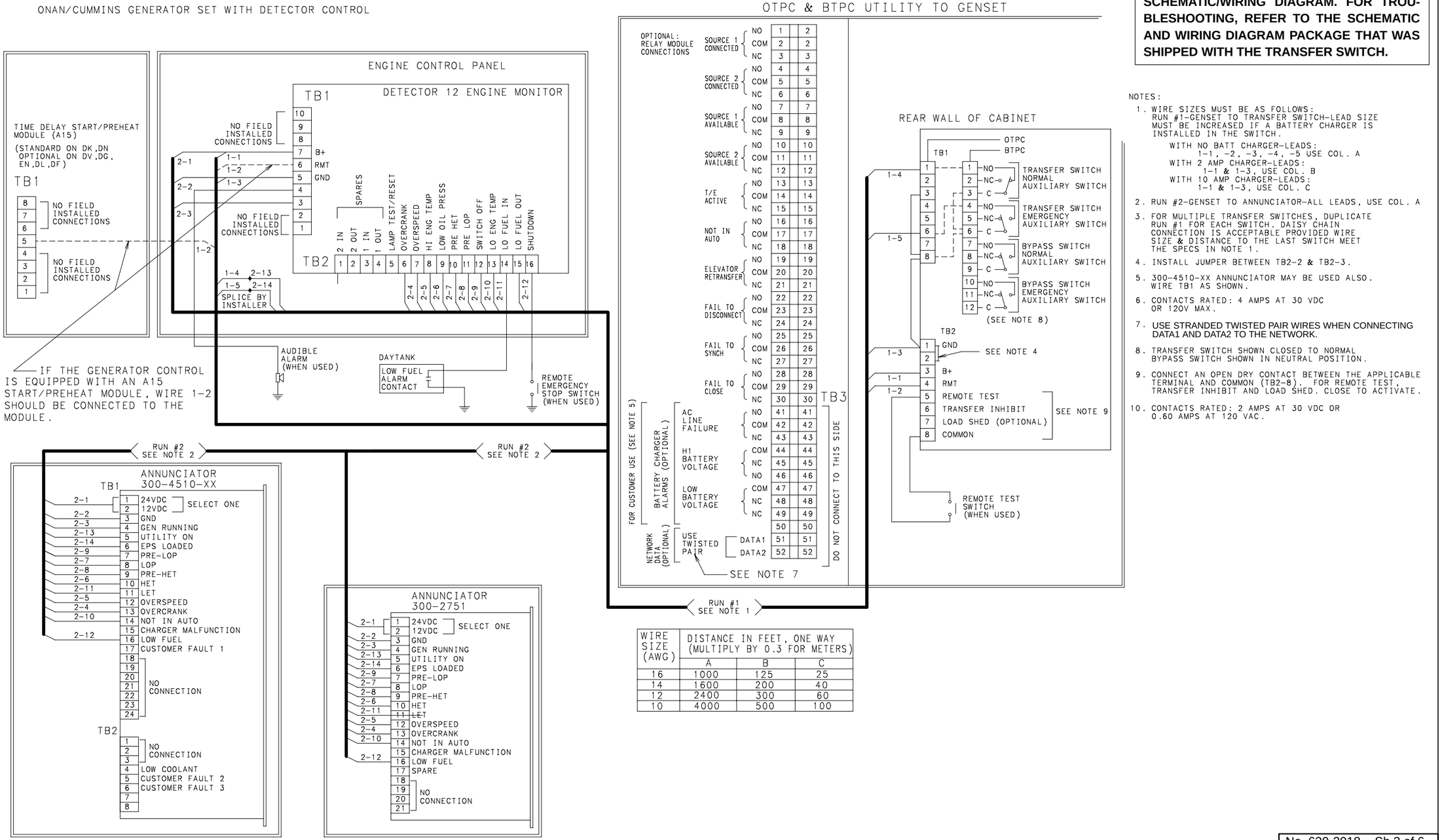
NOTES:

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-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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. 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 900–0366 (TP–78 NETWORKS) OR 900–0529 (FT–10 NETWORKS) POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL FOR WIRING INSTRUCTIONS.
7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
8. INSTALL JUMPER BETWEEN TB1–1 & TB1–2 FOR SETS WITH PCC 3100 CONTROL.
9. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
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.

No. 630-2018 Sh 2 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 2 OF 6)

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.



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

NOTES:

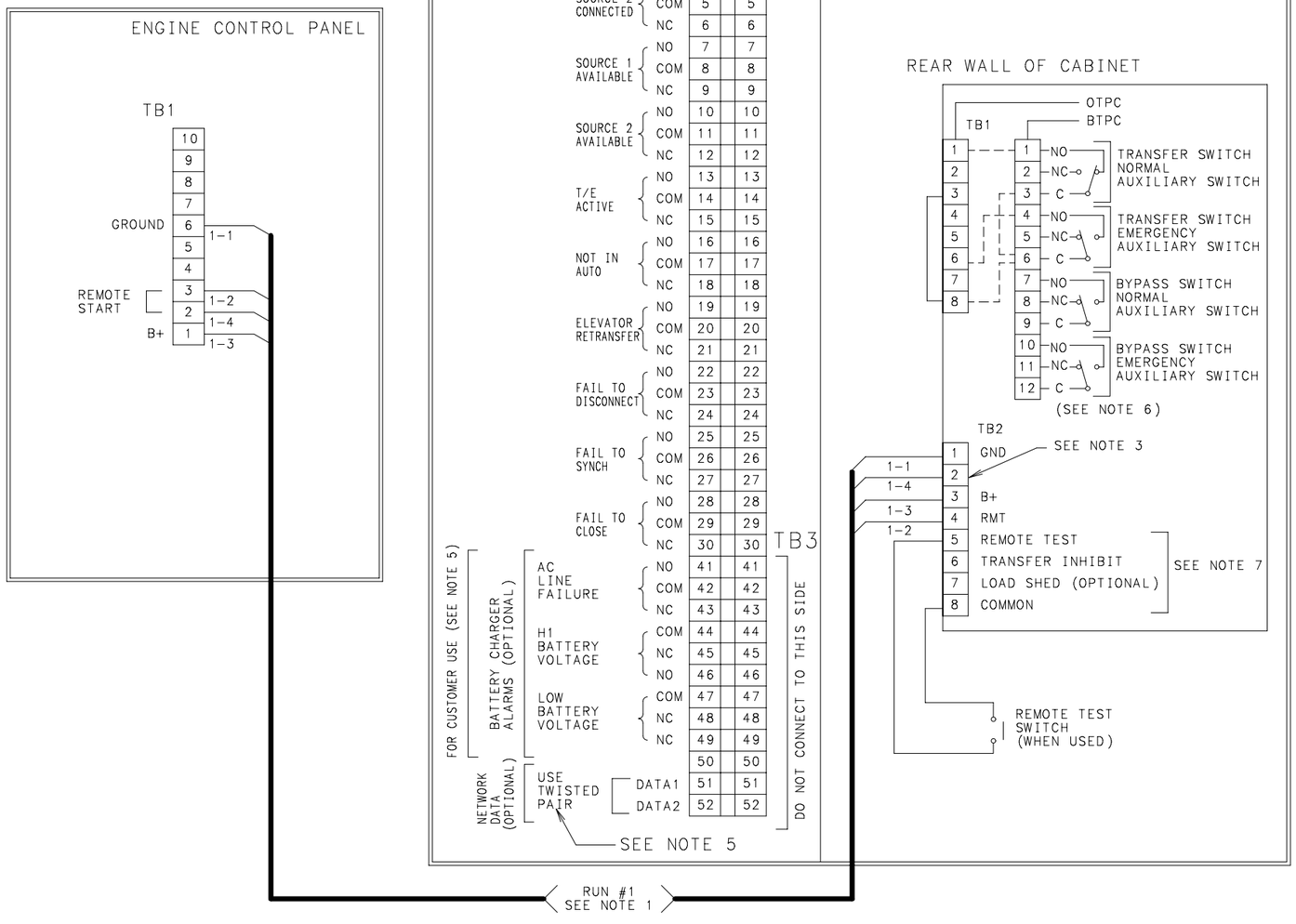
1. WIRE SIZES MUST BE AS FOLLOWS:
   RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.
   WITH NO BATT CHARGER-LEADS: 1-1, -2, -3, -4, -5 USE COL. A
   WITH 2 AMP CHARGER-LEADS: 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS: 1-1 & 1-3, USE COL. C
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 TB1 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.

No. 630-2018 Sh 3 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 3 OF 6)

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.

ONAN/CUMMINS GENERATOR SET SERIES GGDB ALL SPECS, GN SPEC B, DN SPEC B WITH TWO WIRE CONTROL



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

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 1-2, -4 USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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.

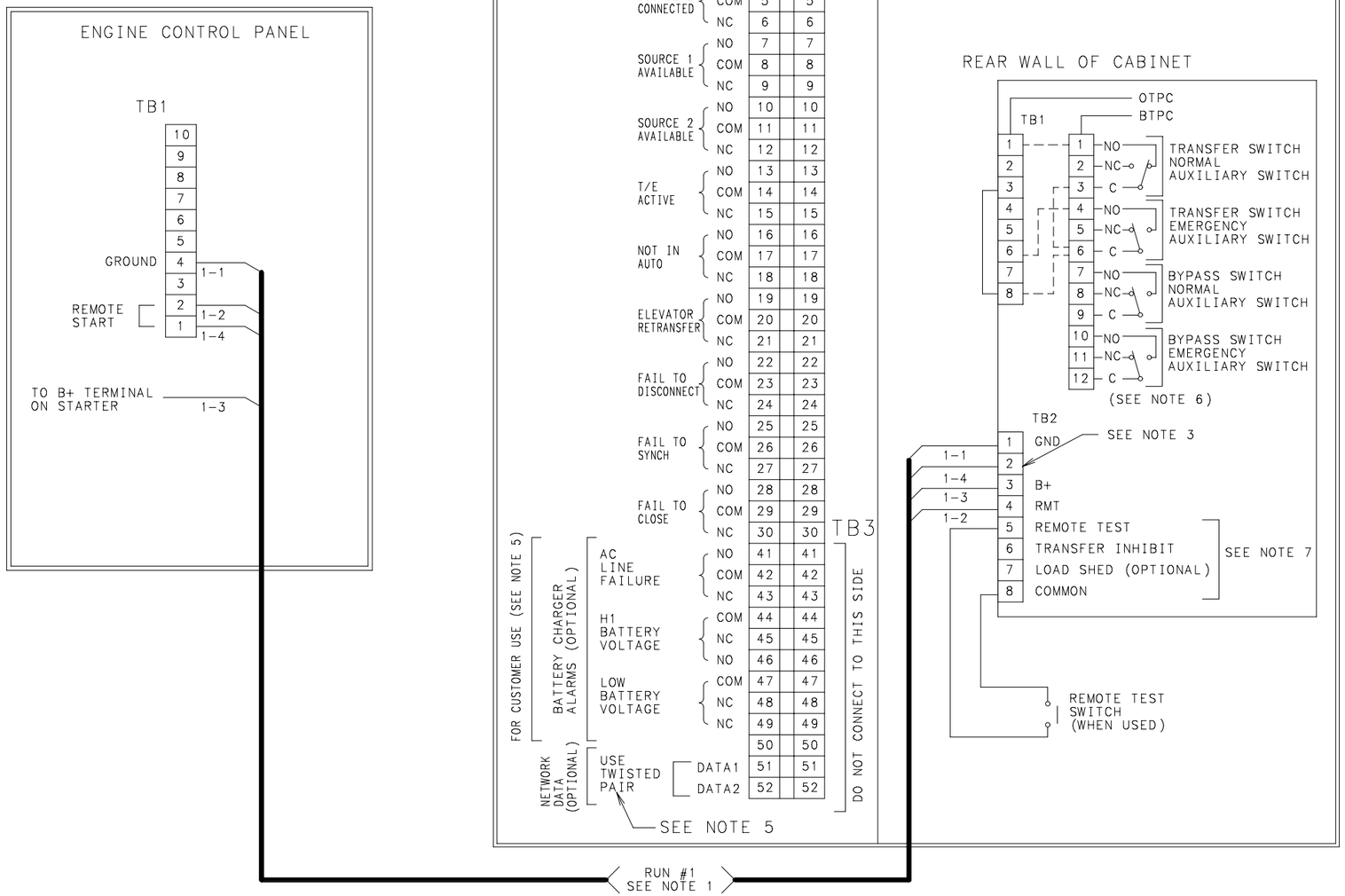
No. 630-2018 Sh 4 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 4 OF 6)

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.

ONAN/CUMMINS GENERATOR SET

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



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

NOTES:

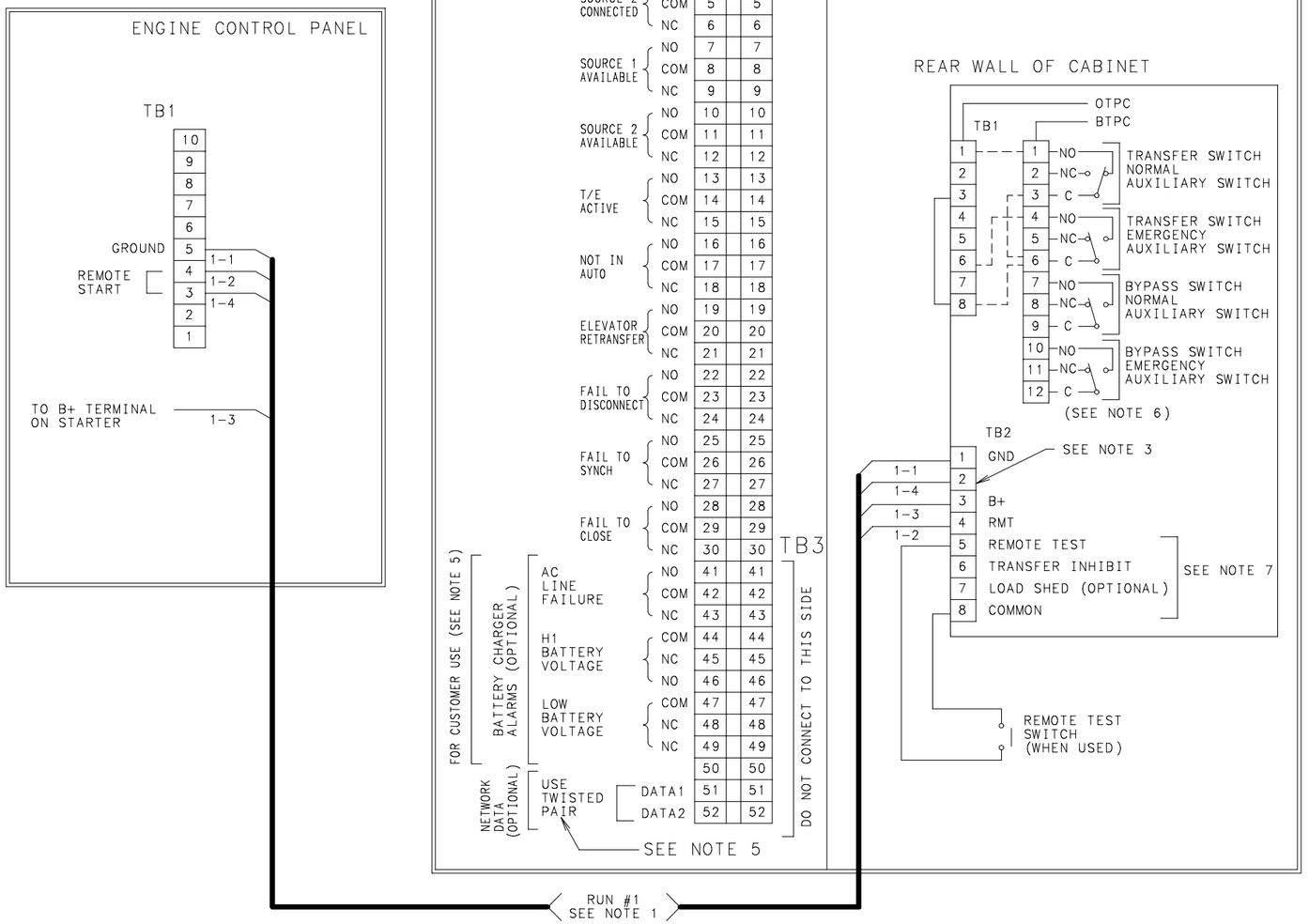
1. WIRE SIZES MUST BE AS FOLLOWS:
   RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.
   WITH NO BATT CHARGER-LEADS 1-2, -4 USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
2. FOR 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.

No. 630-2018 Sh 5 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 5 OF 6)

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.

ONAN/CUMMINS GENERATOR SET SERIES DG, GGFB, GGFC, GGHB, GGHC, GGHD WITH TWO WIRE CONTROL



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)		
	A	B	C
16	1000	125	25
14	1600	200	40
12	2400	300	60
10	4000	500	100

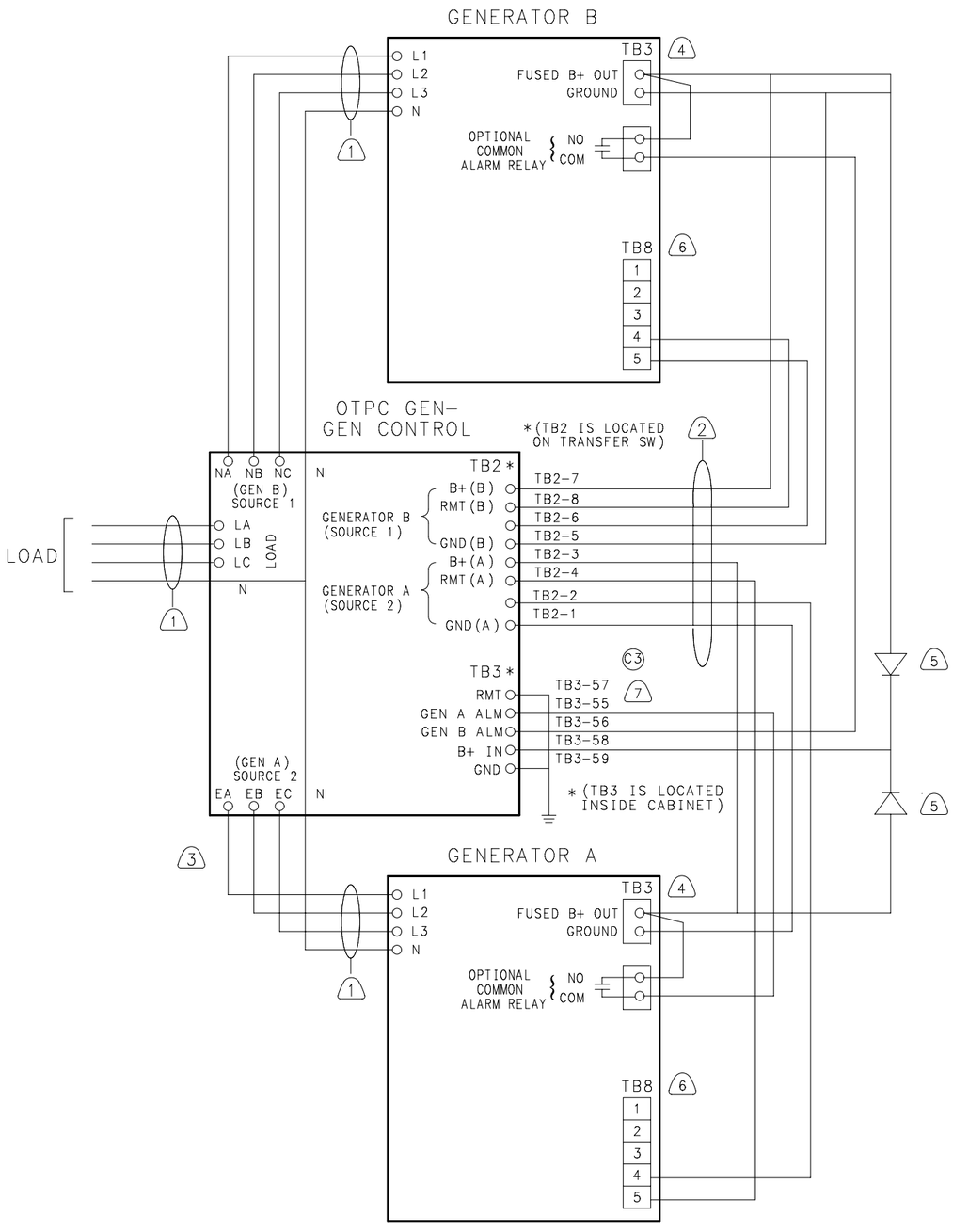
NOTES:

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 1-2, -4, USE COL. A
   WITH 2 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. B
   WITH 10 AMP CHARGER-LEADS 1-1 & 1-3, USE COL. C
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.

No. 630-2018 Sh 6 of 6
Rev. D, Mod Sys: Revisio
Modified 1/2001

1200 – 3000 TYPICAL INTERCONNECTION DIAGRAM (SHT 6 OF 6)

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:

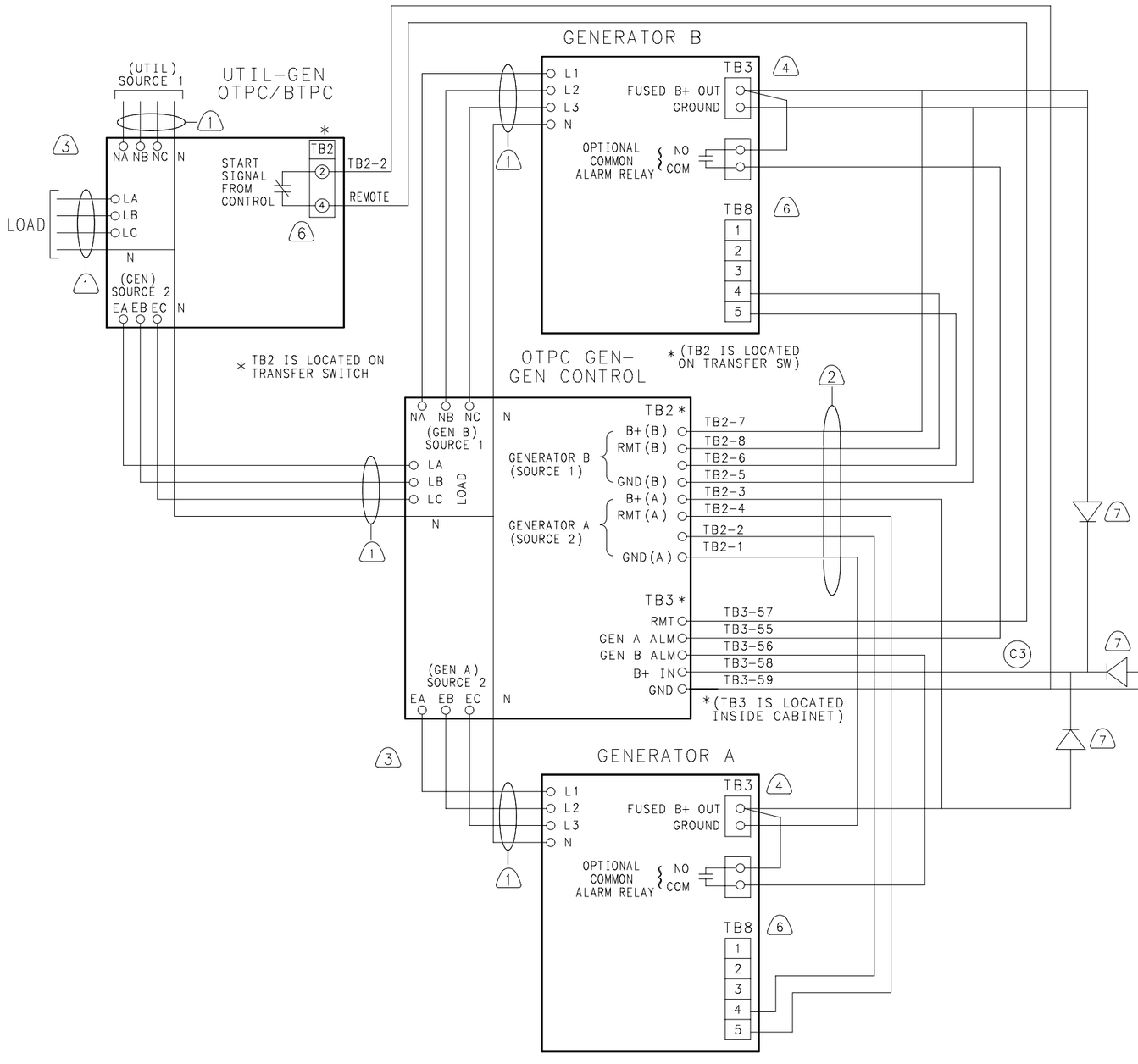
1. CABLES ARE SIZED FOR LOAD & LENGTH OF RUN.
2. USE NO. 16 WIRE FOR DISTANCES UP TO 100 FT.
3. NORMAL SIDE OF OTPC SWITCH IS NA, NB, NC. EMERGENCY SIDE OF OTPC SWITCH IS EA, EB, EC. LOAD SIDE OF OTPC SWITCH IS LA, LB, LC.
4. REFER TO GENERATOR SET WIRING DIAGRAMS FOR PROPER JUMPER SELECTION & TERMINAL NUMBERS FOR SIGNALS.
5. USE 600V/3A RECTIFIER (ONAN NO. 0315-0100 OR SIMILAR). DIODES ONLY NEED TO BE INSTALLED IF NETWORK BOARD IS INSTALLED.
6. TERMINAL BLOCK LOCATED ON CIRCUIT BOARD.
7. FOR DUAL STANDBY OPERATION REFER TO INTERCONNECTION DRAWING 0626-2024.

PLANT TO PLANT
PCC 3200

No. 630–2108 Sh 3 of 3
Rev. C Sys: Revisio
Modified 5/2001

TYPICAL INTERCONNECT DIAGRAM – GENSET TO GENSET, PLANT TO PLANT

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



NOTES:

1. CABLES ARE SIZED FOR LOAD & LENGTH OF RUN.
2. USE NO. 16 WIRE FOR DISTANCES UP TO 100 FT.
3. NORMAL SIDE OF OTPC SWITCH IS NA, NB, NC. EMERGENCY SIDE OF OTPC SWITCH IS EA, EB, EC. LOAD SIDE OF OTPC SWITCH IS LA, LB, LC.
4. REFER TO GENERATOR SET WIRING DIAGRAMS FOR PROPER JUMPER SELECTION & TERMINAL NUMBERS FOR SIGNALS.
5. BATTERY CHARGER IS AVAILABLE ONLY AS AN ACCESSORY. PART NO. 0300-5330.
6. DRY CONTACT ONLY. REMOVE ALL JUMPERS FROM TB2-2.
7. USE 600V/3A RECTIFIERS (ONAN NO. 0357-0100 OR SIMILAR).
8. GENERATOR SET SHOULD BE EQUIPPED WITH SHUTDOWN OPTION.
9. REMOVE JUMPER BETWEEN TB3-57 & GROUND.
10. FOR PROPER OPERATION OF CONTROL, BATTERY VOLTAGE APPLIED TO TB3-58 MUST BE BETWEEN 13-28VDC

DUAL STANDBY SYSTEM
PCC 3200

No. 630–2024 Sh 3 of 3
Rev. D Sys: Revisio
Modified 5/2001

TYPICAL INTERCONNECT DIAGRAM
GENSET TO GENSET, DUAL STAND-BY SYSTEM