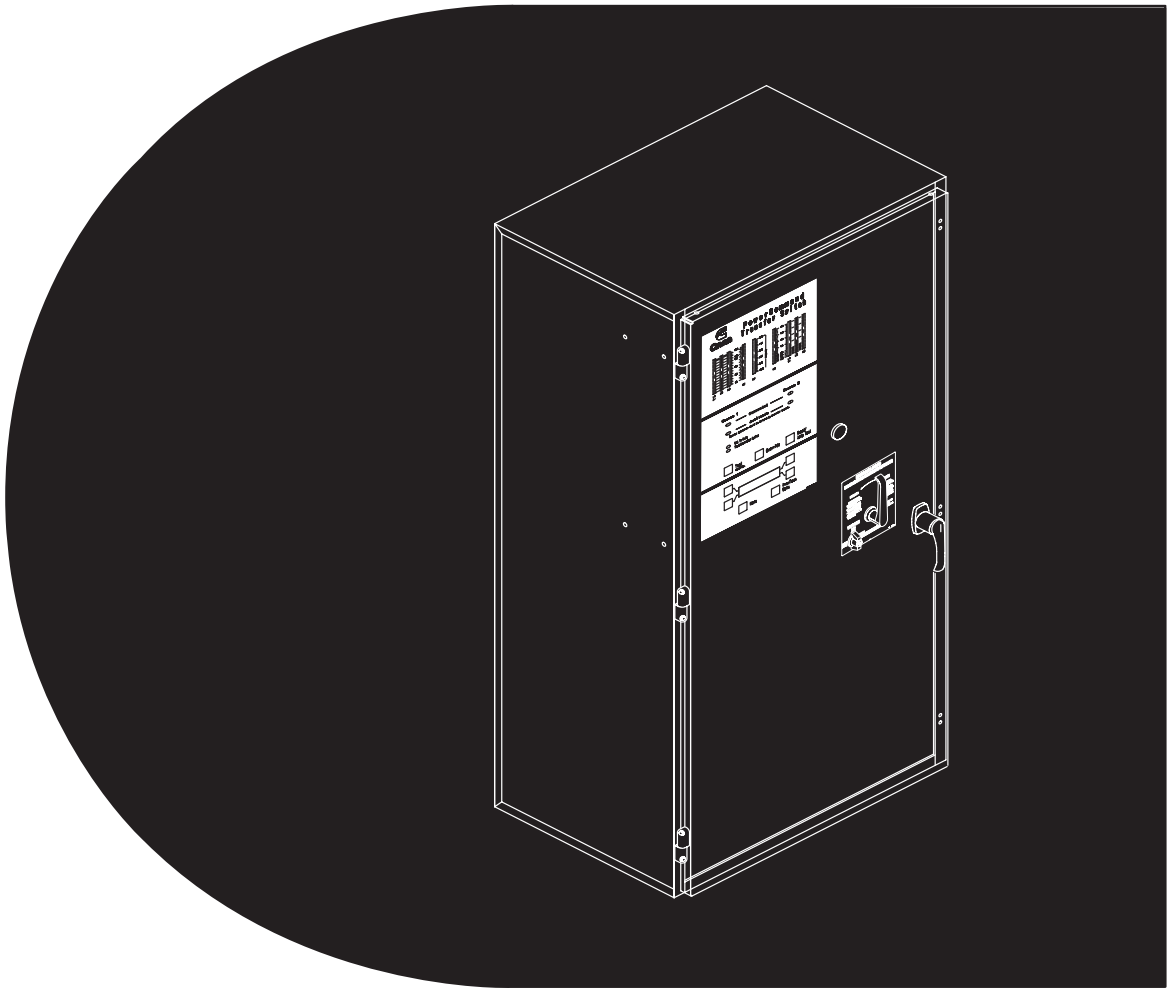
Power Generation

Operator's Manual

OHPC and CHPC Transfer Switches 125 to 800 Amperes



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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.

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

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 or sets 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 TRAINED AND EXPERIENCED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

1. Introduction

OPERATOR'S MANUAL

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

This manual provides information necessary for operation of OHPC and CHPC transfer switches. OHPC is an open transition transfer switch with PowerCommand® Control. CHPC is a closed transition transfer switch with PowerCommand Control.

With an open transition switch there is never a time when both sources are supplying power to the load. With a closed transition switch, the control senses when the two sources are in-phase and briefly (maximum of 0.1 seconds) allows both sides of the switch to close before switching sources.

TRANSFER SWITCH APPLICATION

Transfer switches are an essential part of a building's standby or emergency power system. Power Source 1, commonly the utility line, is backed up by Power Source 2, often a generator set. The transfer switch automatically switches the electrical load from one source to the other.

The load is connected to the common of the automatic transfer switch (ATS) (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.

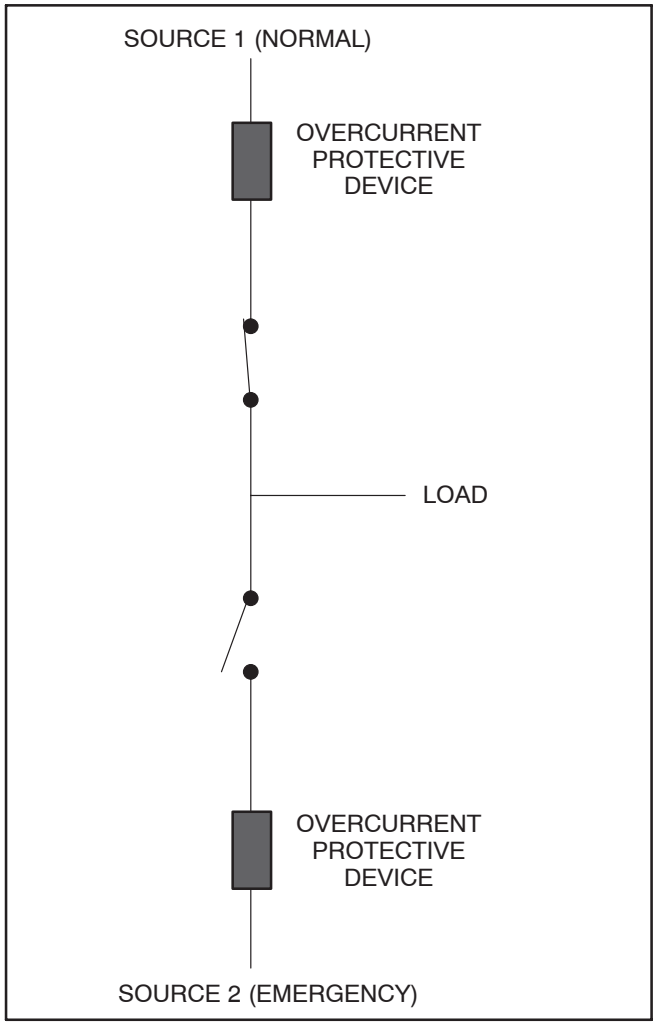

FIGURE 1-1. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

Automatic transfer switches, capable of automatic operation without operator intervention, perform the following basic functions:

UTILITY-TO-GENSET OPERATION

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

1. Senses the interruption of Source 1 power.
2. Sends a start signal to the generator set (Source 2).
3. Transfers the load to 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

Utility-to-utility applications are only available with OHPC transfer switches. In utility-to-utility applications, the transfer switch performs the following functions:

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

Note: The Load Shed feature is not available in this configuration.

GENSET-TO-GENSET OPERATION

A genset-to-genset control is only available with OHPC transfer switches. 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

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

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

LEVEL 1 AND LEVEL 2 CONTROLS

Level 1 and Level 2 controls are available on OHPC transfer switches. Only a Level 2 control is available on CHPC transfer switches. The type of power source switched and the desired features determine which control levels can be used. See the Description section for details. Table 1-1 lists the applications that are available with each control.

TABLE 1-1. AVAILABLE CONTROL LEVELS

Power Sources	Level 1	Level 2
Utility-to-Genset	OHPC	OHPC/CHPC
Genset-to-Genset	—	OHPC
Utility-to-Utility	—	OHPC

SEQUENCE OF OPERATION

OHPC Transfer Switches

The following describes the sequence of operation for an OHPC transfer switch during a **normal (utility) power failure** (see Figure 1-2).

Transfer from Source 1 to Source 2

This sequence includes a programmed transition and begins with Source 1 supplying power to the load. The Source 1 Available and Source 1 Connected indicators are lit. The sequence ends with Source 2 (generator) assuming the load.

1. When Source 1 goes “out of spec,” the digital board starts a Time Delay to Engine Start (TDES) timer and the Source 1 Available indicator goes out.
2. If the TDES expires without a return to acceptable Source 1 power, the genset receives a remote start signal, the engine starts and accelerates to rated speed.
3. When the alternator output reaches the “pick-up” level, the Source 1 Available indicator is lit. The transfer switch starts the Time Delay Normal to Emergency (TDNE) timer. When this time is complete, the switch moves to the Neutral position. The Source 1 Connected indicator goes out.
4. If there is a programmed transition delay, the transfer switch stops in the Neutral position for the Time Delay Programmed Transition (TDPT) and then completes its transition to the Source 2 position. The Source 2 Connected indicator is lit.

Transfer from Source 2 to Source 1

This sequence includes a programmed transition and begins with Source 2 supplying power to the load. The Source 2 Available and Source 2 Connected indicators are lit. The sequence ends with Source 1 (utility) assuming the load.

1. When Source 1 returns to “in spec,” the Source 1 Available indicator is lit and the digital board starts the Time Delay Emergency to Normal (TDEN) timer. When this time is complete, the switch moves to the Neutral position. The Source 2 Connected indicator goes out.
2. If there is a programmed transition delay, the transfer switch remains in the Neutral position for the TDPT delay and then completes its transition to the Source 1 position. The Source 1 Connected indicator is lit.
3. A Time Delay Engine Cool-down (TDEC) for the genset is activated. When the engine cool-down delay expires, the genset shuts down and the Source 1 Available indicator goes out.

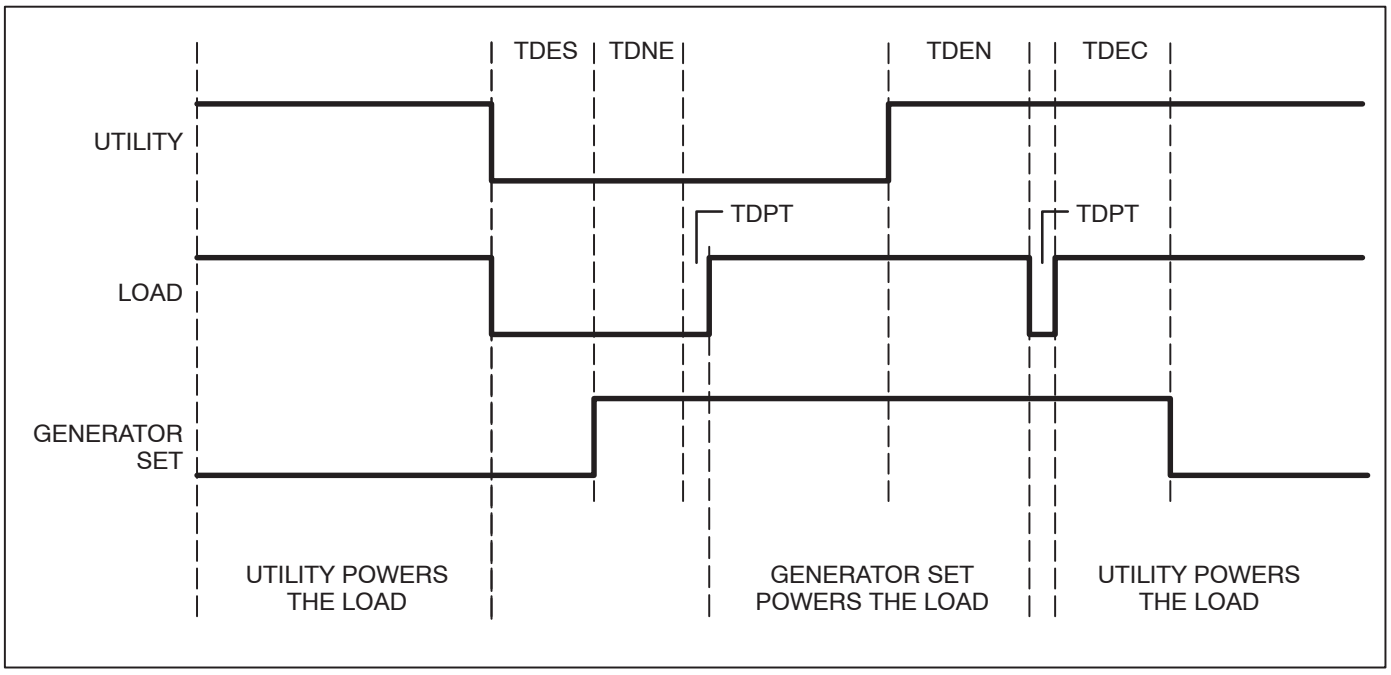

FIGURE 1-2. OHPC SEQUENCE OF OPERATION

CHPC Transfer Switches

When a CHPC switch transfers between an out-of-spec source and a good source, the control initiates an open transition transfer. When transferring between two live sources that are in sync, the control initiates a closed transition transfer.

The following describes the sequence of operation for a CHPC transfer switch during a **normal (utility) power failure** (see Figure 1-3).

Transfer from Source 1 to Source 2

This sequence includes a programmed transition and begins with Source 1 supplying power to the load. The Source 1 Available and Source 1 Connected indicators are lit. The sequence ends with Source 2 (generator) assuming the load.

1. When source 1 goes “out of spec,” the digital board starts a Time Delay to Start (TDES) timer and the Source 1 Available indicator goes out.
2. If the TDES expires without a return to acceptable Source 1 power, the genset receives a remote start signal, the engine starts and accelerates to rated speed.
3. When the alternator output reaches the “pick-up” level, the Source 1 Available indicator is lit. The transfer switch starts the Time Delay Normal to Emergency (TDNE) timer. When this time is complete, the switch moves to the Neutral position. The Source 1 Connected indicator goes out.
4. If there is a programmed transition delay, the transfer switch stops in the Neutral position for the Time Delay Programmed Transition (TDPT) and then completes its transition to the Source 2 position. The Source 2 Connected indicator is lit.

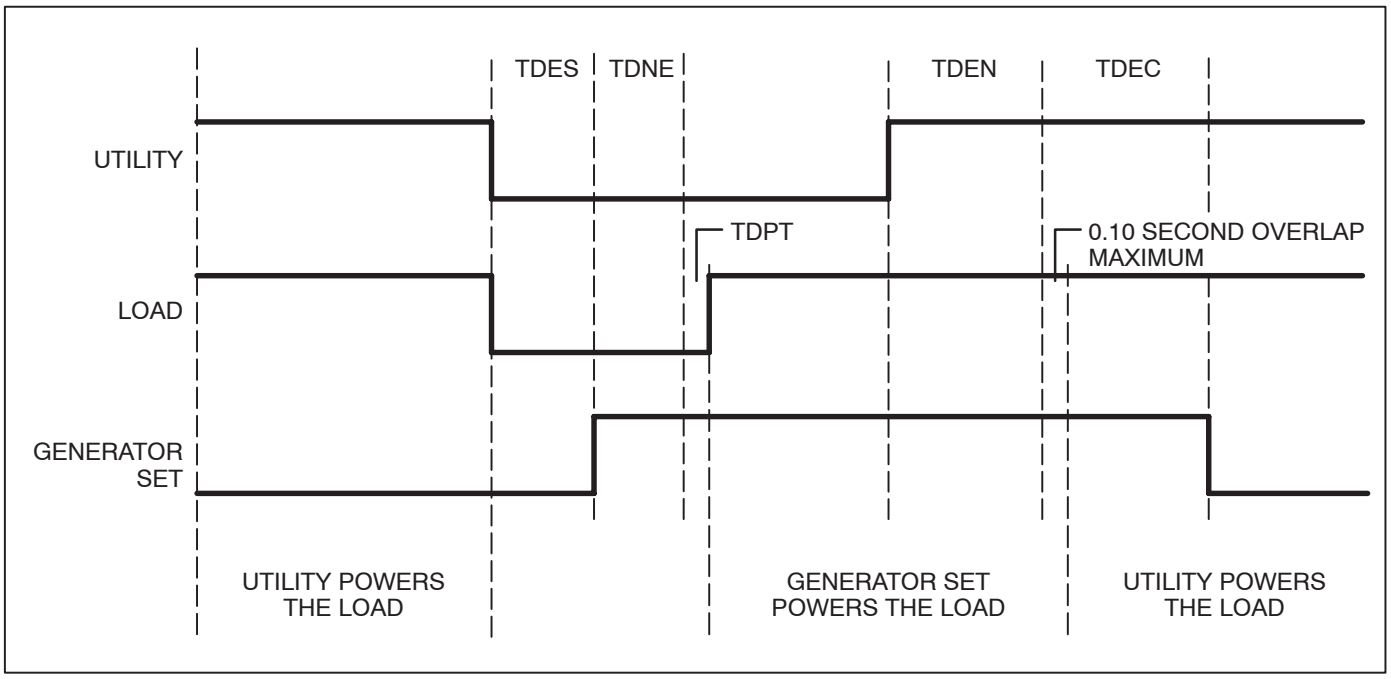

FIGURE 1-3. CHPC SEQUENCE OF OPERATION

Transfer from Source 2 to Source 1

This sequence includes a closed transition and begins with Source 2 supplying power to the load. The Source 2 Available and Source 2 Connected indicators are lit. The sequence ends with Source 1 (utility) assuming the load.

1. When Source 1 returns to “in spec,” the Source 1 Available indicator is lit The digital board starts the Time Delay Emergency to Normal (TDEN) timer. When this time is complete, and Source 2 and Source 1 are in sync, the control initiates a closed transition transfer. (If the sources fail to sync, the control initiates an open transition.)
2. The Source 1 contacts are closed and within 100 milliseconds, the Source 2 contacts are opened. The Source 1 Connected indicator is lit followed by the Source 2 Connected indicator going off.
3. A Time Delay Engine Cool-down (TDEC) for the genset is activated. When the engine cool-down delay expires, the genset shuts down and the Source 1 Available indicator goes out.

NOTE 1: You may notice a brief buzzing sound during closed transition operation. The sound is coming from the solenoids and is normal.

NOTE 2: During a Test sequence, the control initiates a closed transition when transferring to Source 2 and when transferring back to Source 1.

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 (see Figure 1-4), which is located on the cabinet door.

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

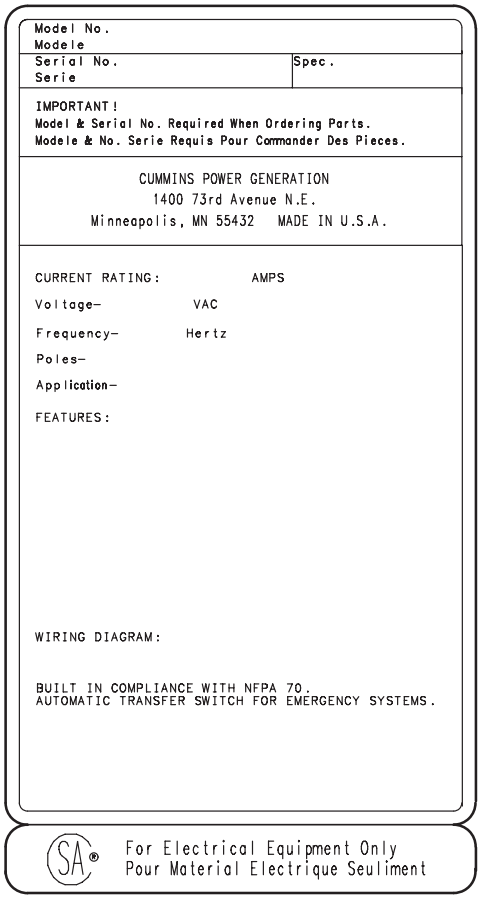

FIGURE 1-4. NAMEPLATE

The model number is made up of code segments that designate various features or options:

OHPCA– 00000
| | |
1 2 3

Serial Number Spec.A
| |
4 5

1. OHPC = Open Transition Transfer Switch with PowerCommand Control
   CHPC = Closed Transition Transfer Switch with PowerCommand Control

2. Ampere Rating:
   A = 125
   B = 150, 225, 260
   C = 300, 400, 600
   D = 800

3. Assigned spec number – issued for each specific combination of accessories, voltages, frequency and standards codes. This number is only repeated for stock product.

4. Serial Number – A unique number assigned to the transfer switch.

5. Specification letter – advances with production modification.

HOW TO OBTAIN SERVICE

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

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

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

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

For outside North America, call Cummins Power Generation, 1-763-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday. Or, send a fax to Cummins Power Generation using the fax number 1-763-528-7229.

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

2. Description

The OHPC transfer switch is available in two control package options: Level 1 and Level 2. Level 1 has the standard feature set and Level 2 has an extended set of features and applications. While both Level 1 and Level 2 control packages are available with OHPC transfer switches, only the Level 2 control package is available with CHPC transfer switches.

This section describes the control cabinet, the switch mechanism, and the standard and optional control features. Figure 2-1 shows the control with optional control features.

CABINET

The standard cabinet meets the requirements of the National Electrical Manufacturers Association (NEMA) for a UL Type 1 cabinet. Cabinets are available in NEMA types 1, 3R, 4, and 12. The various types are designated as general-purpose, indoor or outdoor cabinets.

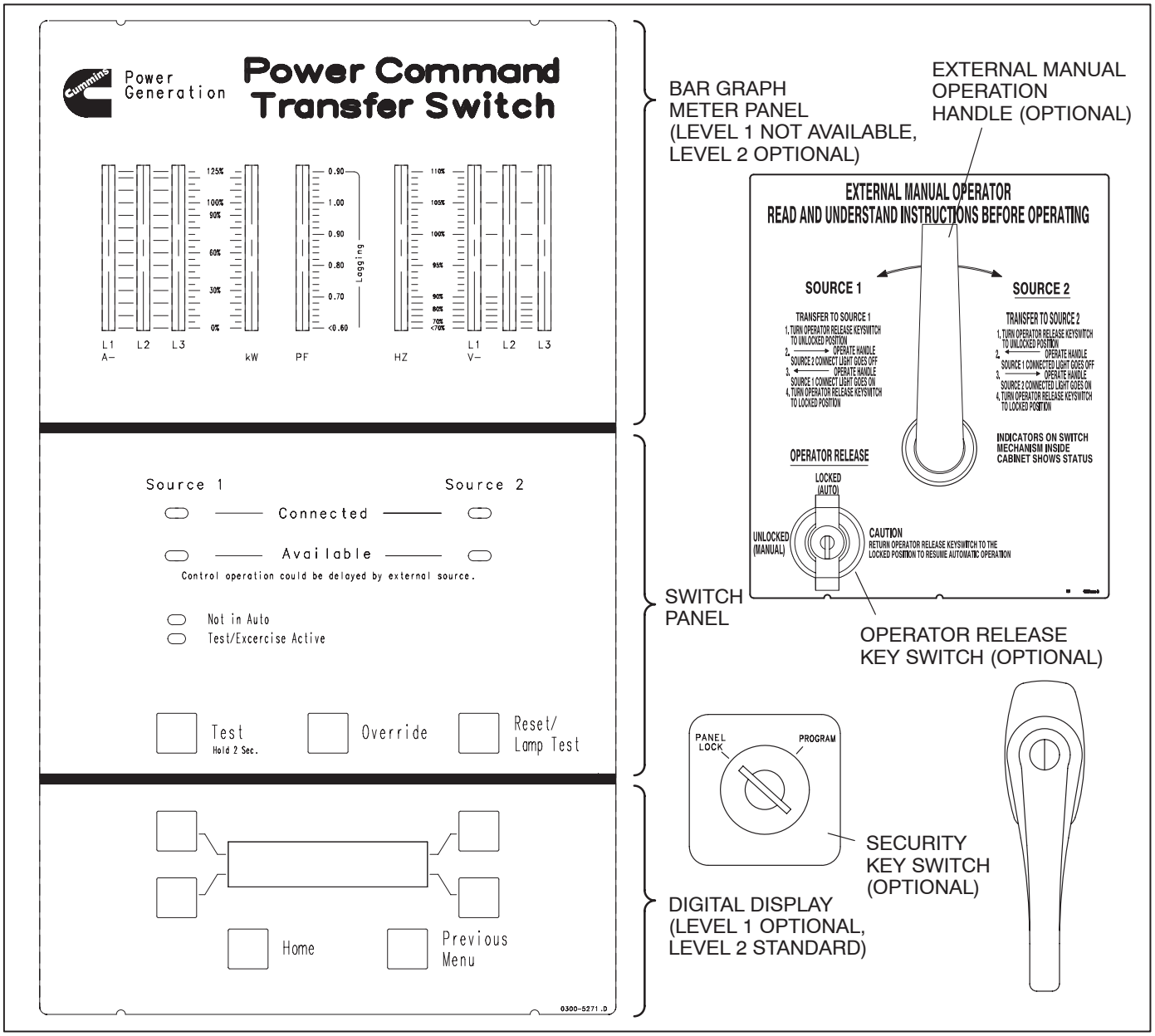

FIGURE 2-1. CABINET WITH OPTIONS

CONTROL PANEL

The control features are divided into three groups:

- Bar Graph Meter Panel – Not available on Level 1 controls and is optional on Level 2 controls
- Switch Panel – Standard on all transfer switches
- Digital Display – Optional on Level 1 controls and is standard on Level 2 controls

BAR GRAPH METER PANEL

The Bar Graph Meter Panel is not available on Level 1 controls and is optional on Level 2 controls. This feature includes a three phase AC ammeter, a power meter, a power factor meter, a frequency meter, and a three phase AC voltmeter.

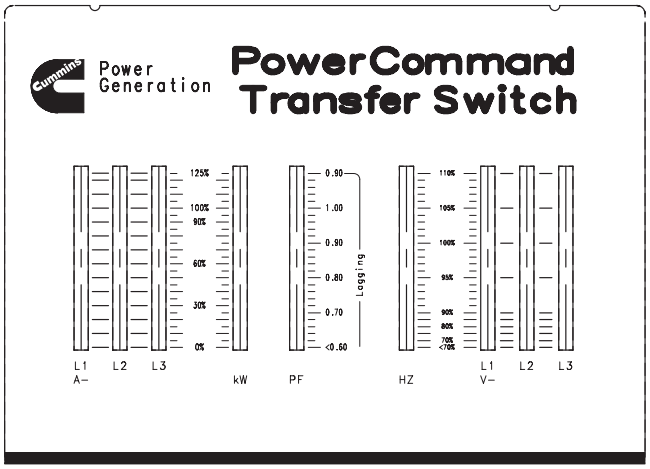

FIGURE 2-2. BAR GRAPH METER PANEL

AC Ammeter: The ammeter displays percent of full load currents in amperes (1–125%).

Power Meter: The power meter displays the real power in percent of full load in kilowatts (0–125%).

Power Factor Meter: The power factor meter displays the real power delivered to the load (1.0 – 0.6 lagging) and (1.0 – 0.9 leading).

Frequency Meter: This meter displays the output frequency (percent of nominal frequency), of the power source connected to the load (70–110%).

AC Voltmeter: The voltmeter displays percent of line-to-neutral voltages of the power source connected to the load (70–110%).

SWITCH PANEL

The switch panel (see Figure 2-1) is standard on all transfer switches and contains six indicator lamps and three membrane switches.

Indicator Lamps

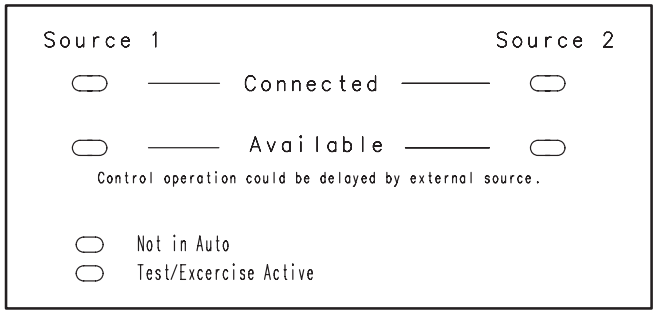

FIGURE 2-3. SWITCH PANEL INDICATOR LAMPS

Source 1 Connected: This indicator is lit when the transfer switch is in the Source 1 position.

Source 2 Connected: This indicator is lit when the transfer switch is in the Source 2 position.

Source 1 Available and Source 2 Available: These indicators are lit when the corresponding sources have acceptable output voltage and/or frequency. These indicators can be lit simultaneously.

Not in Auto: For all configurations, the Not in Auto indicator flashes when the transfer switch is not in auto. The indicator blinks at a 1 second rate. The transfer switch is not in auto when any of the following occurs:

- Motor Disconnect Switch is set to Off
- Fail-to-Disconnect event is active
- Fail-to-Charge Spring event is active
- Control is locked out
- P12 connector is disconnected from the Power Module
- Controller is set to Offline
- The Operator Release key switch is in the Unlocked (Manual) position – This only applies to models that include the optional external manual operation handle.

Test/Exercise Active: The Test/Exercise Active indicator is lit when the transfer switch has a test or exercise in progress.

Membrane Switches

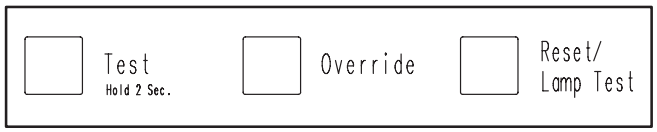

FIGURE 2-4. SWITCH PANEL MEMBRANE SWITCHES

Test: For *utility-to-genset* applications, a start signal is sent to the generator set designated as Source 2 when the Test switch is pressed for two seconds. The Test/Exercise Active indicator blinks for a couple of seconds and then stays on.

After the start and transfer time delays, Source 2 starts and assumes the load, provided that the Test With Load option is selected. Press the Test switch again to end the test. Source 1 resumes as the source of power and the Test/Exercise Active indicator goes out. After the transfer is complete, the generator goes through a cool-down period and shuts off.

For *utility-to-utility* applications, a time delay to transfer is activated before switching to Source 2. The Test/Exercise Active indicator blinks for a couple of seconds and then stays on. After the transfer time delay, Source 2 assumes the load, provided that the Test With Load option is selected. Press the Test switch again to end the test. Source 1 resumes as the source of power and the Test/Exercise Active indicator goes out.

For *genset-to-genset* applications, there is no test function.

Override: The Override switch terminates some system time delays. The Program Transition, Elevator signal and Engine Cool Down are not affected by this switch. If you press this switch while the Transfer Inhibit input is active, the switch immediately transfers the load. If you press this switch while the Retransfer Inhibit input is active, the switch immediately retransfers the load.

Reset/Lamp Test: The Reset/Lamp Test switch turns on all control panel indicators. This switch also acknowledges events (refer to Section 5: Events).

DIGITAL DISPLAY

The digital display is standard on Level 2 controls and is optional on Level 1 controls. It contains a 2-line by 20-character digital display module and 6 momentary contact membrane switches. The module displays the menu system. The switches are used to navigate through the menu system and change parameters, if necessary.

Each menu indicates the function of the four switches at the sides of the display module. Not all switches are active for each menu. See Section 4 (Digital Display Menu System) for complete details of the menus.

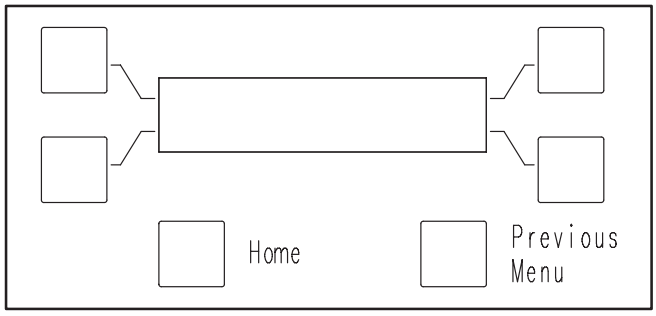

FIGURE 2-5. DIGITAL DISPLAY

SECURITY KEY SWITCH OPTION

The optional security key switch is located on the front panel between the handle and the Control Panel. When it is in the Panel Lock position, it disables the front panel Test and Override input switches.

Although current values are displayed when the security key switch is in the Panel Lock position, changes to the digital display from the setup menus cannot be made. Changes can only be made when the switch is in the Program position.

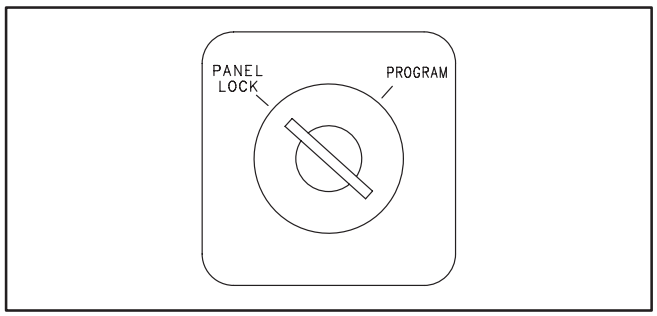

FIGURE 2-6. SECURITY KEY SWITCH

EXTERNAL MANUAL OPERATION OPTION

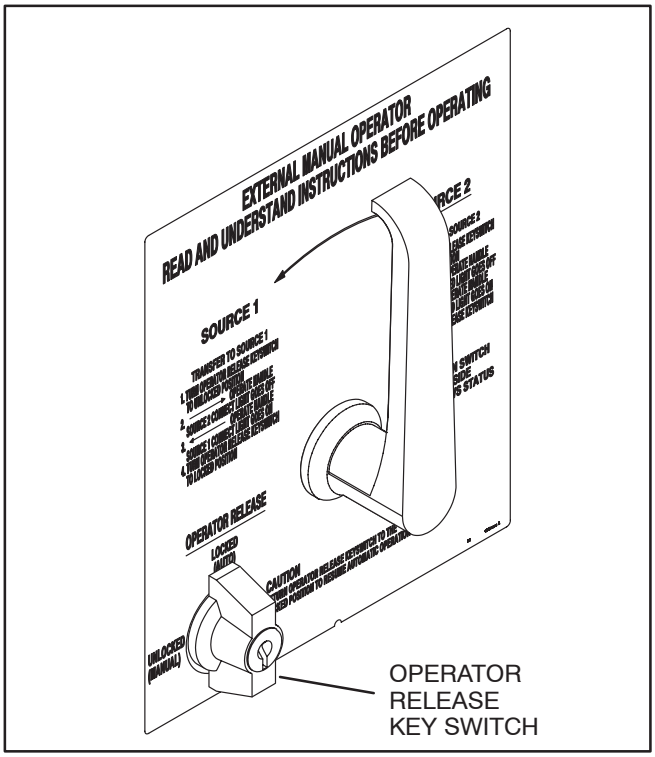

FIGURE 2-7. EXTERNAL MANUAL OPERATION HANDLE

The external manual operation handle is located near the center of the front panel. The handle allows the operator to manually transfer the load without opening the cabinet door.

This option also includes a Operator Release key switch, located near the external manual operation handle. When it is in the Locked (Auto) position, the transfer switch operates automatically and the key switch prevents use of the external manual operation handle. The key switch must be placed in the Unlocked (Manual) position in order to use the external manual operation handle to manually transfer the load.

For more information on this option, see “Manual Operation” on page 3-16.

ELECTRONIC CONTROL SYSTEM

This section describes the standard and optional components of the electronic control system.

⚠WARNING ***Improper calibration or adjustment of electronic control modules can cause death, severe personal injury, and equipment or property damage. Calibration and adjustment of these components must be performed by technically qualified personnel only.***

All calibration and adjustment procedures are described in the Installation Manual (which is shipped with the transfer switch) and in the Service Manual (which is available through your distributor).

⚠WARNING ***Accidental actuation of the actuator could cause severe personal injury. Before making any adjustments, place the Motor Disconnect Switch (Figure 2-12) in the Off position. Return the switch to the Auto position after adjustments are completed.***

⚠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. When the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.***

Electronic Control Circuit Modules

The OHPC/CHPC transfer switch control incorporates a Digital and a Power Module. Two versions of the Digital and Power Module are available on OHPC transfer switches: one for Level 1 controls and one for Level 2 controls. Only the Digital and Power Modules for Level 2 controls are available on CHPC transfer switches. The location of these modules on the inside of the transfer switch door is shown in Figure 2-8.

The Digital Module contains the logic and timing circuits that control transfer switch operation. This module also contains many of the customer interface circuits (including the genset start signal and network port), the RS-232 communications port for the PC Service tool, and drivers for the control panel indicators, switches, and bar graph meter panel.

The Power Module supplies power to the Digital Module, and contains voltage sensing transformers, and relays. This module also contains the interface circuits for the transfer switch, including the position sensing switches and relay drivers.

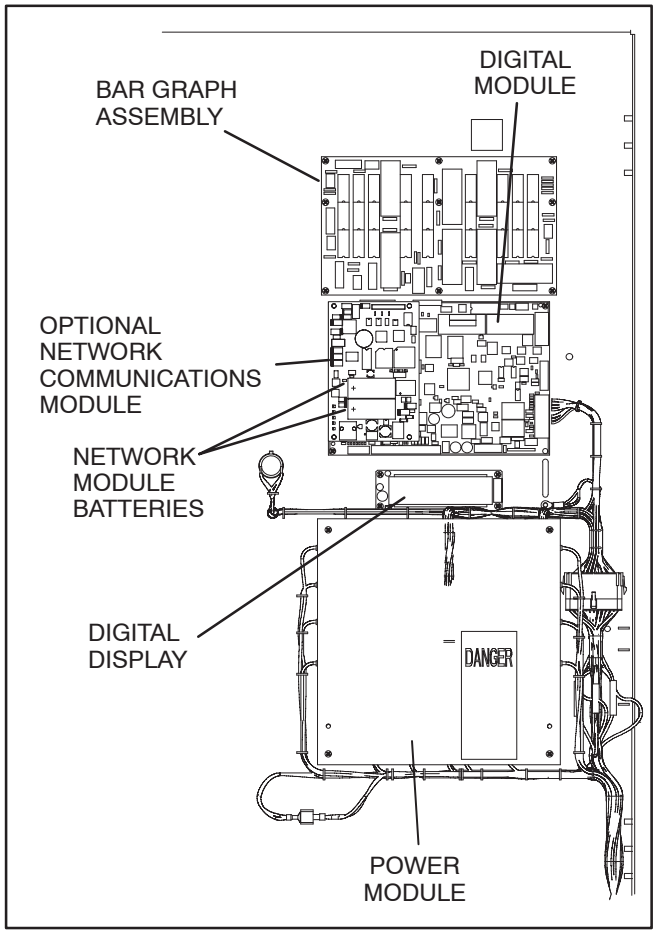

FIGURE 2-8. INTERIOR CONTROL COMPONENTS

Transfer Inhibit

This feature is used to control load transfer to gensets. When activated, load transfer will not take place unless the Override button on the switch panel is pressed or the transfer inhibit input is disabled.

Transfer Inhibits are setup by connecting a remote contact between TB2-6 and TB2-8. Closing the contact enables the feature and opening the contact disables it. Transfer Inhibits are setup using the PC Service tool and a remote switch inside the cabinet connected to TB2. When enabled, the event is displayed on the front panel. If Source 1 (or the preferred source in genset-to-genset applications) fails, transfer inhibit is ignored.

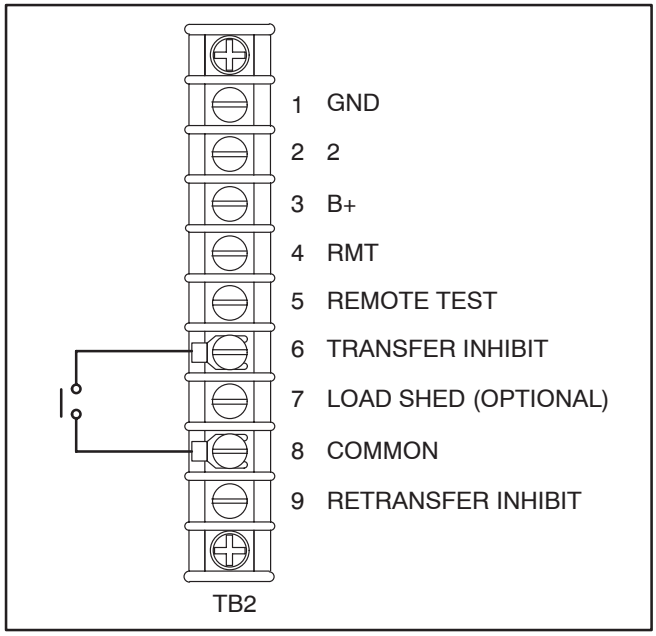

FIGURE 2-9. TB2 CONNECTIONS FOR TRANSFER INHIBIT

Retransfer Inhibit

This feature is used to prevent the ATS from automatically transferring the load back to Source 1 (or the preferred source in genset-to-genset applications). When activated, load transfer will not take place unless the Override button on the switch panel is pressed, the retransfer inhibit input is disabled, or Source 2 (or the backup source in genset-to-genset applications) fails.

NOTE: If Source 2 (or the backup source in genset-to-genset applications) fails, the Retransfer Inhibit is ignored.

Retransfer Inhibits are set up by connecting a remote contact between TB2-8 and TB2-9. Closing the contact enables the feature and opening the contact disables it. When enabled, the event is displayed on the front panel.

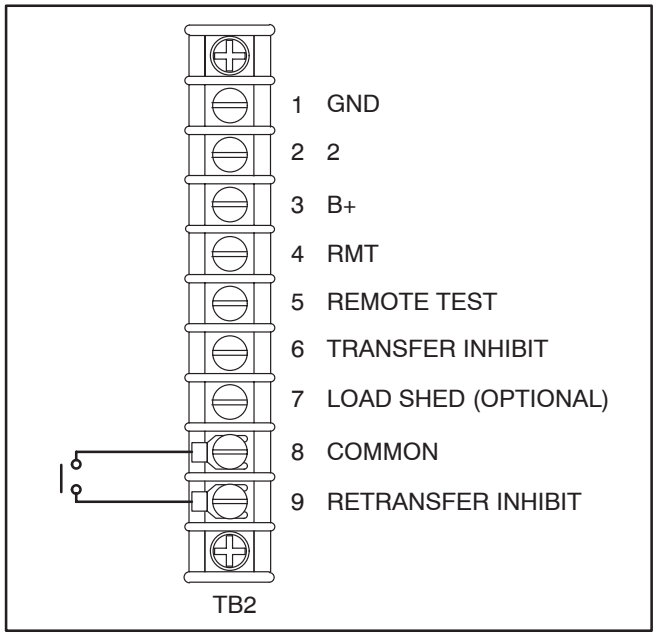

FIGURE 2-10. TB2 CONNECTIONS FOR RETRANSFER INHIBIT

Remote Test Switch

The transfer switch may be wired with a remote test switch.

For utility-to-genset applications, closure of a set of contacts across the remote test transfer input (TB2-5 and TB2-8) causes the transfer switch to sense a (simulated) utility power failure and sends a start/run signal to the generator set. The load is transferred to Source 2 when Source 2 becomes available.

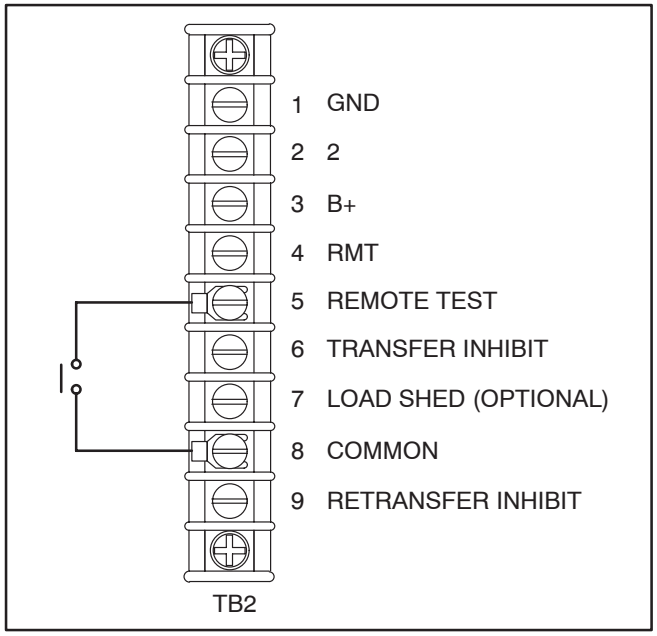

FIGURE 2-11. TB2 CONNECTIONS FOR REMOTE TEST TRANSFER

Opening a set of contacts across the remote test transfer input causes the transfer switch to sense that utility power has been restored and transfers the load back to Source 1.

For utility-to-utility applications, closure of a set of contacts across the remote test transfer input (TB2-5 and TB2-8) causes the transfer switch to sense a (simulated) power failure of the primary source and transfers the load to the backup source.

Opening a set of contacts across the remote test transfer input causes the transfer switch to sense that the primary source has been restored and transfers the load back to the primary source.

Two-Wire Starting

The starting circuit is a basic supervisory function of the electronic control. Water-cooled generator sets use a two-wire start control.

Although the logic is more involved, the two-wire starting circuit can be thought of as a single pole, single throw switch. A closed switch starts the generator set. An open switch stops the generator.

NOTE: Three-wire starting is not available on OHPC/CHPC transfer switches.

REAL-TIME CLOCK

All controllers have a real-time clock that keeps track of the time and date. The controller uses the real-time clock to time and date stamp all events.

The clock is not set at the factory. To set the clock, use the digital display (see page 4-22) or the PC Service tool.

Information on setting the clock is included in Section 3.

NOTE: If the batteries are weak or not in place during a power failure, the clock will need to be reset.

PROGRAMMABLE GENERATOR EXERCISER

Programmable generator exercises and exercise exceptions are generally programmed to be recurring. They can be programmed from the PC Service tool or the digital display when it is available (see page 4-17).

Level 1 controllers include one programmable generator exercise and one programmable exercise exception.

Level 2 controllers include eight programmable generator exercises and eight programmable exercise exceptions. While all events can be set using the PC Service tool, only two exercises and two exercise exceptions can be set with the digital display.

The real-time clock must be set before exercise programs are entered. The clock can be set using the PC Service tool or the digital display (see page 4-22).

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

Information on setting up exercises and exercise exceptions is included in Section 3.

TRANSFER SWITCH ASSEMBLY

The transfer switch opens and closes the contacts that transfer the load between Source 1 and Source 2. The main parts of the switch discussed here are the contact assemblies, actuator, motor disconnect switch, and auxiliary contacts. Major components inside the transfer switch cabinet are shown in Figure 2-12. Details of the transfer switch and actuator assembly are shown in Figure 2-13.

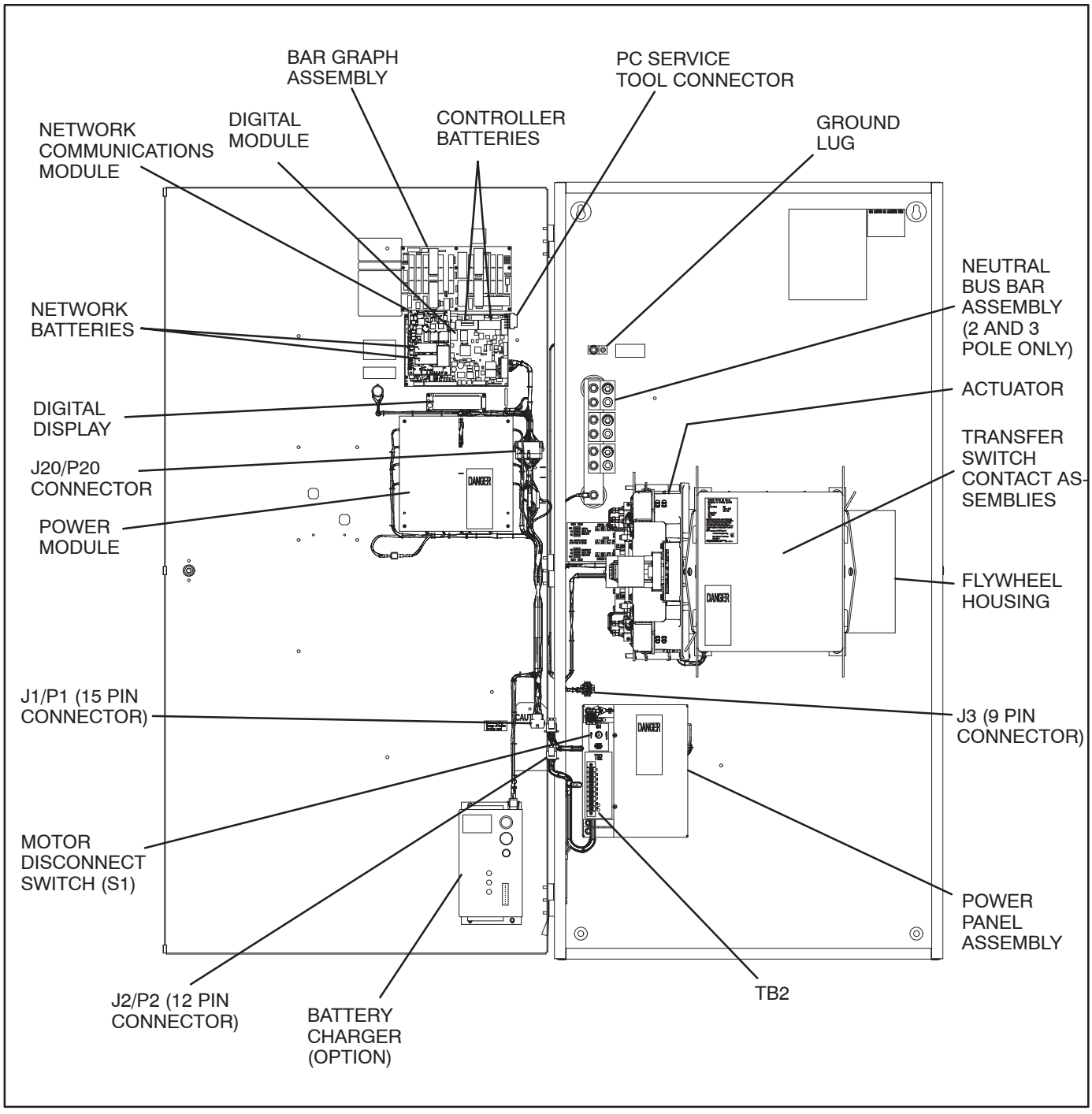

FIGURE 2-12. INTERIOR COMPONENTS (300–600 AMP SWITCH SHOWN)

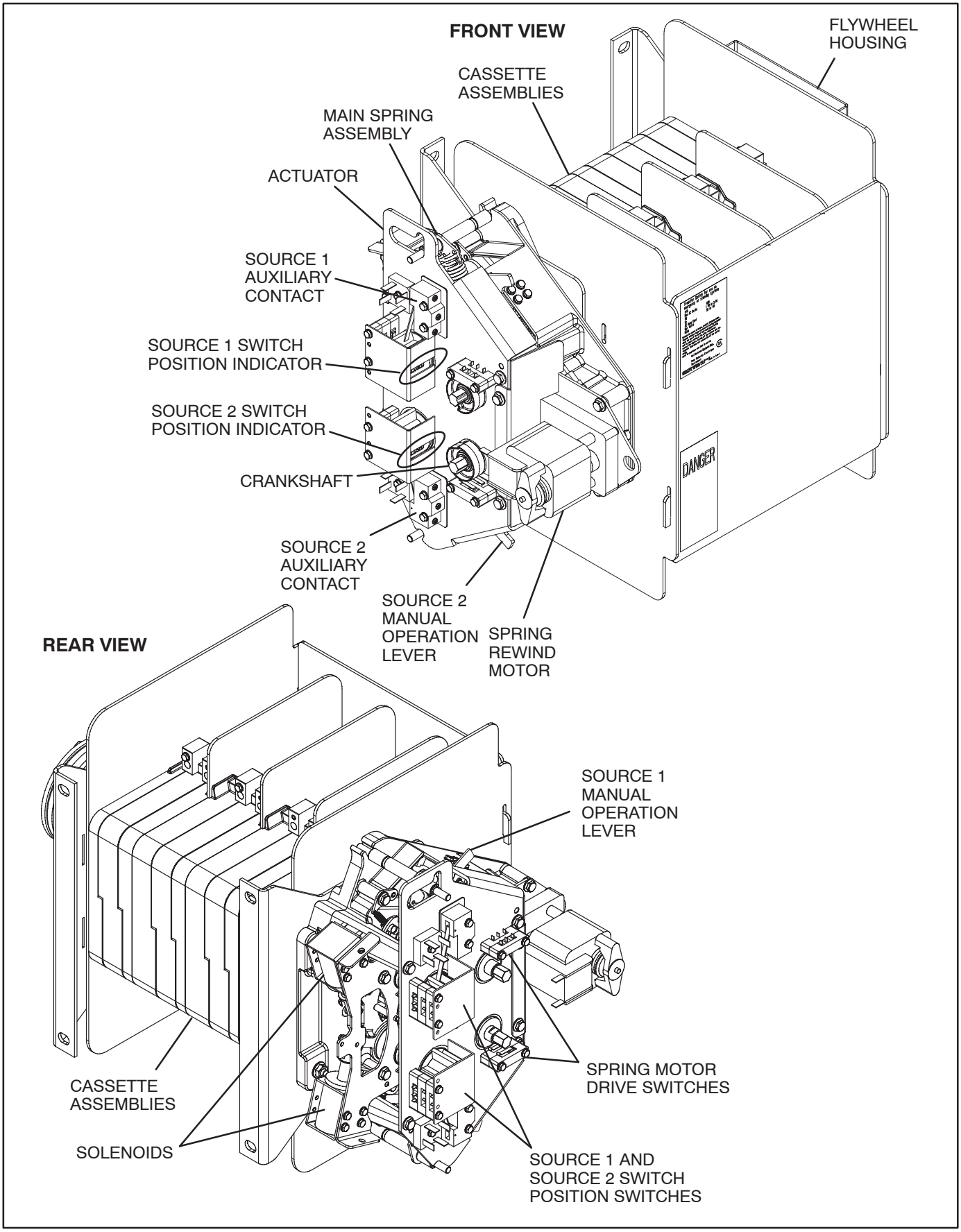

FIGURE 2-13. ACTUATOR AND TRANSFER SWITCH (300–600 AMP SWITCH SHOWN)

Actuator

The actuator moves the contact assemblies between the contacts of Source 1 and Source 2. Operation is initiated automatically by the transfer switch. Manual operation of the switch is also possible. Refer to “Manual Operation” on page 3-16.

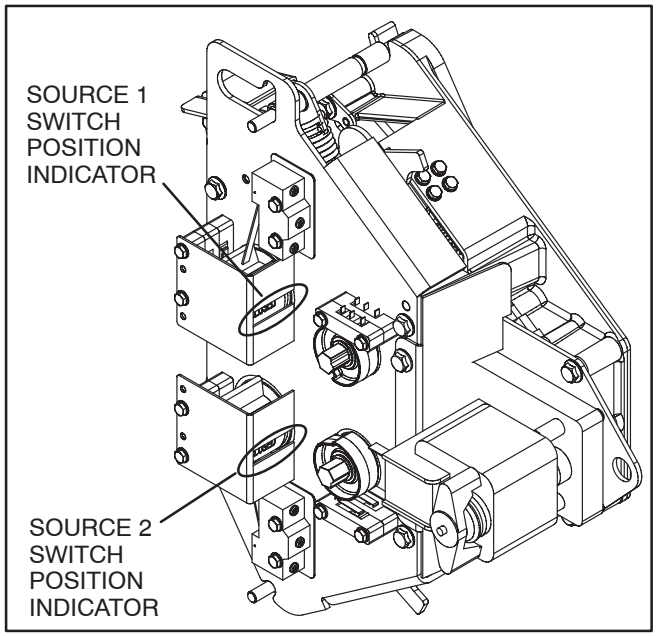

FIGURE 2-14. ACTUATOR

Switch Position Indicators

“OPEN” or “CLOSED” switch position indicators for Source 1 and Source 2 are shown on the actuator (see Figure 2-13). If a switch position indicator reads “CLOSED,” the transfer switch is connected to that source and the switch position indicator for the other source reads “OPEN.”

Motor Disconnect Switch

The motor disconnect toggle switch, on the power panel assembly, enables and disables electrical (automatic) operation of the transfer switch. This switch is only accessible from inside the enclosure. The Not In Auto LED on the front panel indicates the state of this switch. It will flash when the switch is in the Off position. Place the switch in the Auto position to enable automatic operation of the transfer switch. Place the switch in the Off position to disable automatic operation.

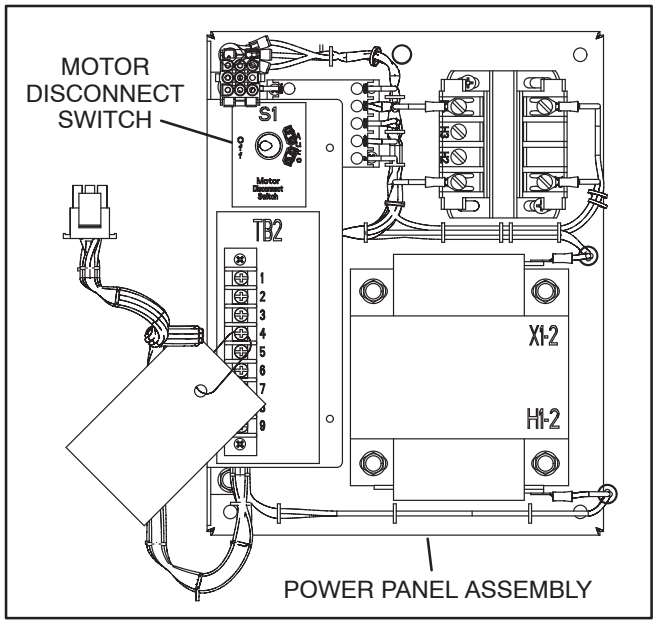

FIGURE 2-15. MOTOR DISCONNECT SWITCH

Contact Assemblies

Single phase transfer switches have two poles. Three phase transfer switches have either three or four poles. Two and three pole transfer switches are provided with a solid neutral bar. The contact assemblies make and break the current flow. When closed to either Source 1 or Source 2, the contacts are mechanically held. A mechanical interlock prevents them from closing to both power sources at the same time.

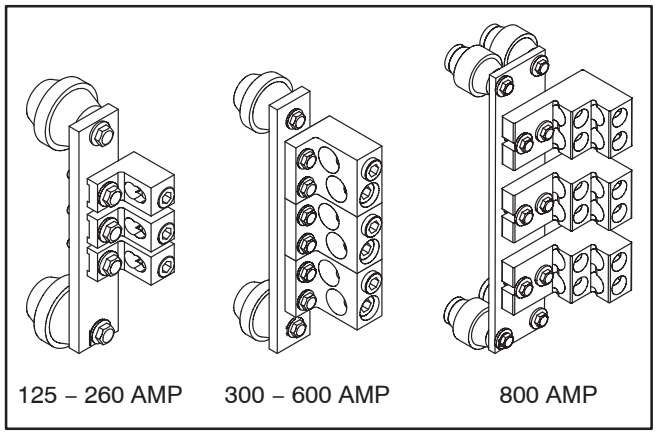

FIGURE 2-16. NEUTRAL BAR ASSEMBLIES FOR 2-POLE AND 3-POLE TRANSFER SWITCHES

Auxiliary Contact Switches

Auxiliary contact switches are provided on the Source 1 and Source 2 sides of the transfer switch. They are actuated by operation of the transfer switch during transfer and retransfer. The Source 1 auxiliary contact switch is actuated when the transfer switch is in the Source 1 position. The Source 2 auxiliary contact switch is actuated when the transfer switch is in the Source 2 position. The auxiliary contacts have current ratings of 10 amperes at 250 VAC. Customer connections are wired directly to the auxiliary contact switch.

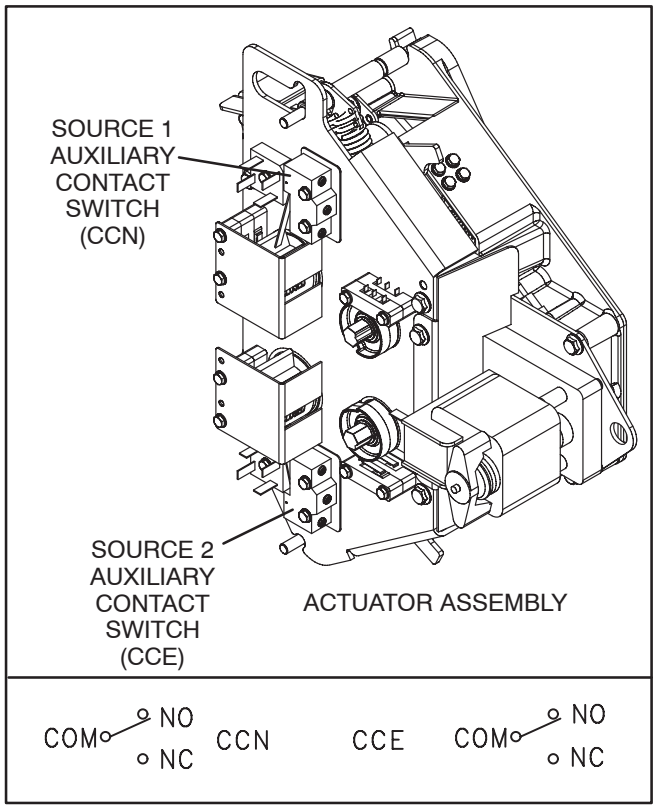

FIGURE 2-17. AUXILIARY CONTACT SWITCHES

Cassette Assemblies

The cassette assemblies hold the movable contacts and load bars. They also include Source 1 and Source 2 lugs. Cassette assemblies are shown in Figures 2-18, 2-19, and 2-20.

The Phase N cassette assembly on four pole transfer switches and the Phase C cassette assembly on three pole transfer switches do not include any magnetic flux shields. All other cassette assemblies include two magnetic flux shields. Flux shields are needed between phases.

All transfer switch cassette assemblies (125–800 amp) include a casette end cover and an interphase cassette. 300–600 amp transfer switch cassette assemblies also include one middle cassette. 800 amp transfer switch cassette assemblies include two middle cassettes.

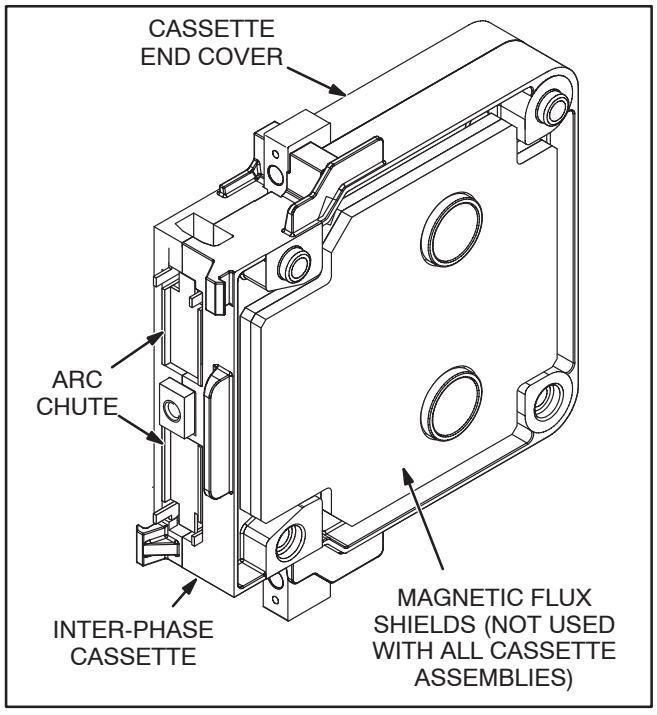

FIGURE 2-18. 125–260 AMP CASSETTE ASSEMBLY

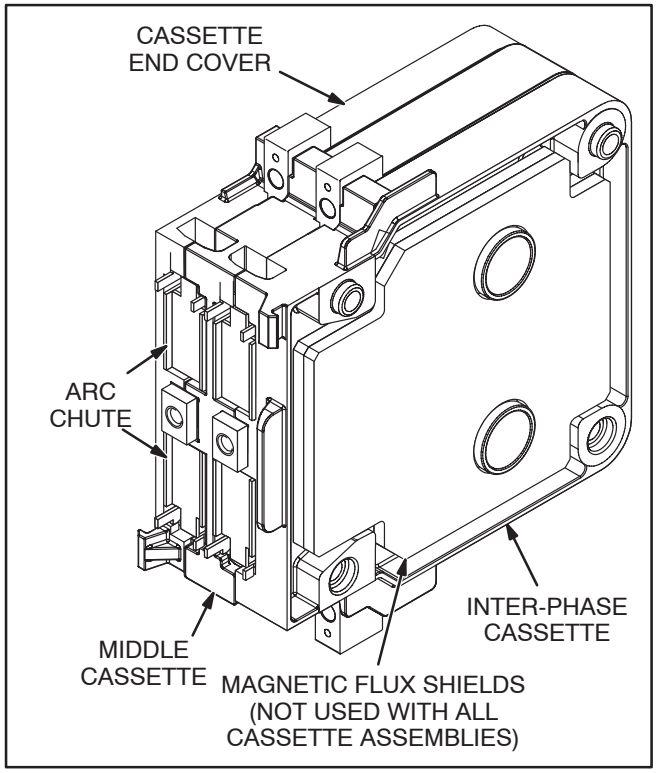

FIGURE 2-19. 300 – 600 AMP CASSETTE ASSEMBLY

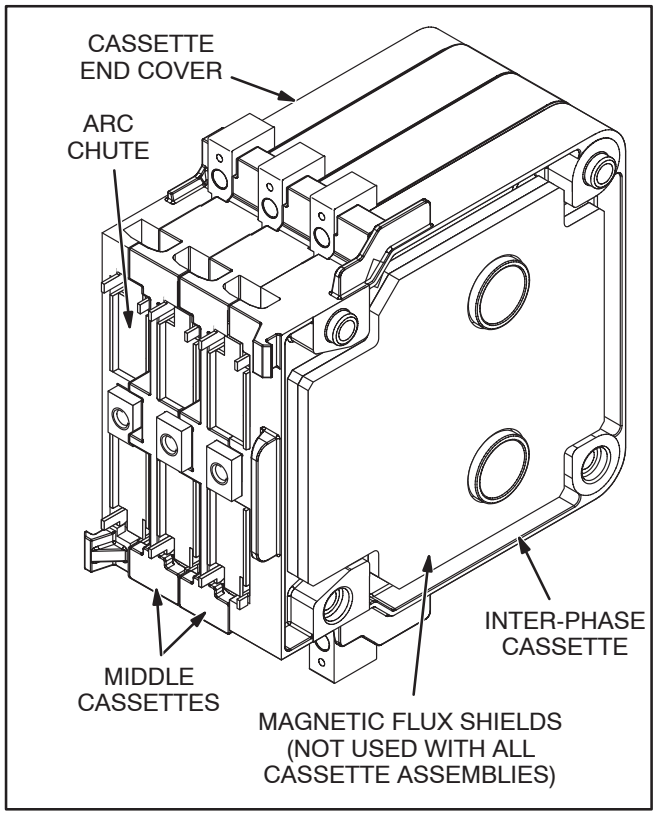

FIGURE 2-20. 800 AMP CASSETTE ASSEMBLY

OPTIONS

Float Battery Charger Option

A float-charge battery charger (Figure 2-21) regulates its charge voltage to continuously charge without damage to the battery. As the battery approaches full charge, the charging current automatically tapers to zero amperes or to steady-state load on the battery. Battery chargers are used with utility-to-genset and genset-to-genset applications.

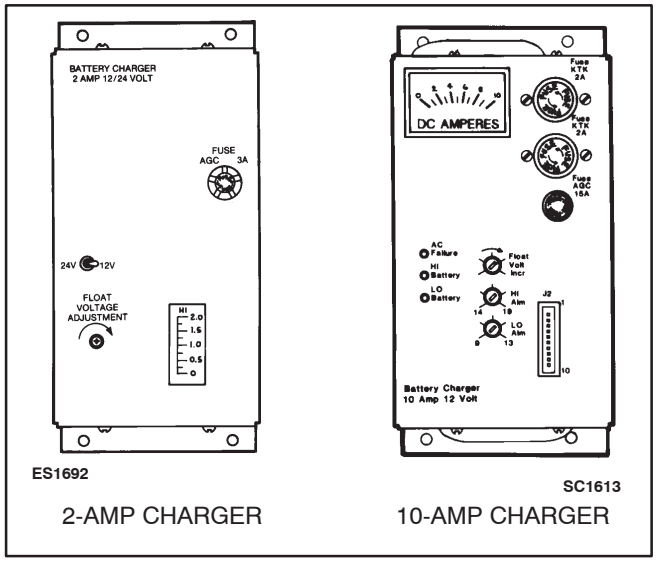

FIGURE 2-21. BATTERY CHARGER

Two battery chargers are available. One battery charger is rated for 10 amperes at 12 or 24 VDC. The other battery charger is rated for 2 amperes at 12 or 24 VDC.

The 2-ampere battery charger has an ammeter to indicate charging current and a fuse to protect the battery charger circuit.

The 10-ampere battery charger has three fuses (two on the AC input and one on the DC output), three fault display LEDs, and an ammeter for indication of charging current.

On the 10-ampere charger, three sets of (Form-C) alarm contacts (corresponding to the three fault LEDs) are also available. Using an optional alarm contact harness, these contacts can be wired by the installer to activate other audible or visual alarms.

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.

Battery Charger Alarm Contacts Option

The optional 10-ampere battery charger can include three sets of Form-C relay contacts, as an additional option (see Figure 2-22).

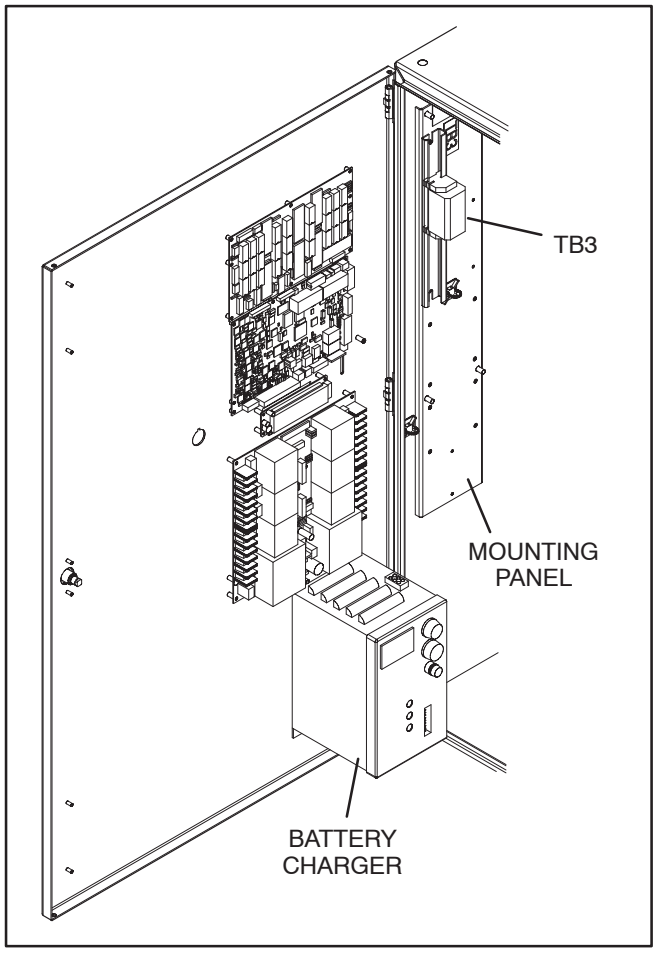

FIGURE 2-22. 10-AMPERE BATTERY CHARGER WITH BATTERY CHARGER ALARM CONTACTS

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 2-23). See Figure 2-25 for the location of TB3 on the option panel.

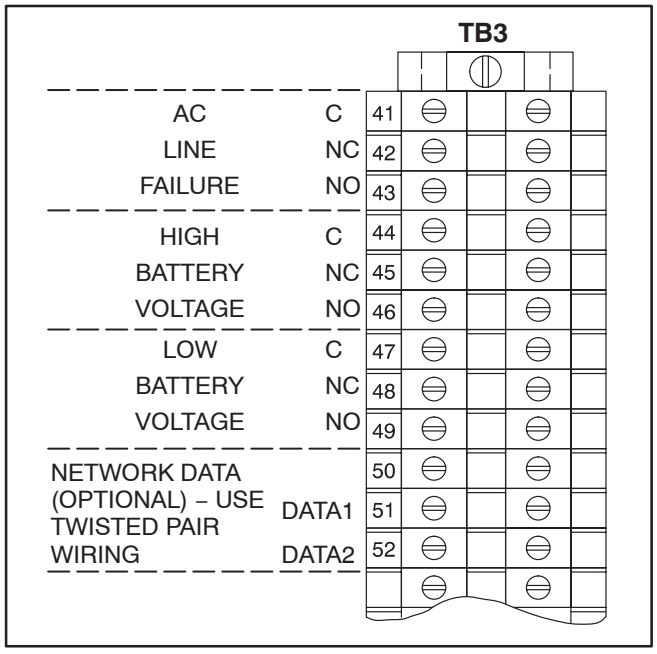

FIGURE 2-23. BATTERY CHARGER ALARM CONTACTS AND NETWORK CONNECTIONS

PowerCommand Network Interface Module Option

The PowerCommand® network interface module option provides connection to the PowerCommand network. The module is LonWorks compatible for integration into customer monitoring strategy. Refer to the FT-10 Network Installation and Operation Manual (900–0529) for network details.

With a PowerCommand network interface, B+ from the genset is brought into the transfer switch by a lead connected from TB2, terminal 3 on the power panel assembly of the transfer switch to J27, pin 21 on the digital module.

The Network Interface Module is only enabled with the PC Service tool.

For installations that include a PowerCommand Network Communications Module (NCM), stranded twisted pair network cable is connected to the left side of terminals 51 and 52 on TB3 (see Figure 2-23). The NCM is located on the left side of the digital module (see Figure 2-12).

Load Shed Option

The optional Load Shed function is used to disconnect the load from an available power Source 2 in order to reduce the power consumed from that source. When the load shed function is initiated, the transfer switch is moved to the neutral position.

When load shedding is active and power Source 1 returns, the control immediately retransfers to power Source 1.

If the load shed signal is removed before power Source 1 returns, the switch transfers back to power Source 2.

The Load Shed feature can be enabled or disabled with the PC Service tool.

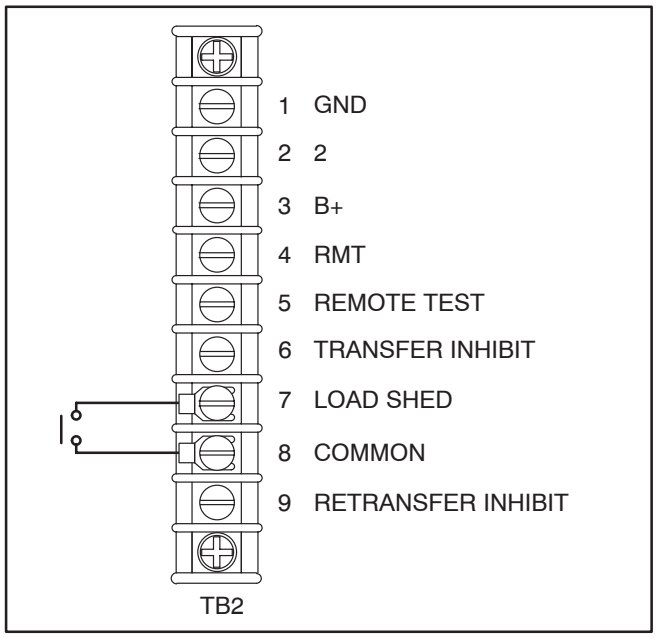

FIGURE 2-24. TB2 CONNECTIONS FOR LOAD SHED OPTION

Load Sequencing Option

Controllers can include up to eight timed network variables to use for turning on loads in sequence after a transfer, a retransfer, or both. The Network Communications Module (NCM) must be installed. Each variable can be delayed up to 60 seconds after the preceding variable. The network variables are intended to activate relays on the Network Digital Input/Output Module (DIM). The DIM is located remotely from the transfer switch.

Load Current and Power Sensor Option

Three-phase Level 2 controllers can include a load current and power sensor (Current Module). The control senses the four load currents (three line currents and the neutral current), three load voltages, and three power factor angles. The control calculates the real load power and the apparent load power.

The load current sensing feature is active on Level 2 controllers when the Current Module is installed and connected to the digital module.

The control issues a warning when the neutral current exceeds a user specified value between 100 and 150% of the rated current during a specified time period between 10 and 60 seconds.

The warning threshold (100 – 150%) and time delay (10 – 60 sec) can only be set with the PC Service tool.

Auxiliary Relay Option

Optional 12 and 24 VDC auxiliary relays provide contacts for energizing external alarms, remote indicators, and control equipment such as louver motors and water pumps. Auxiliary relays are used with utility-to-genset and genset-to-genset applications.

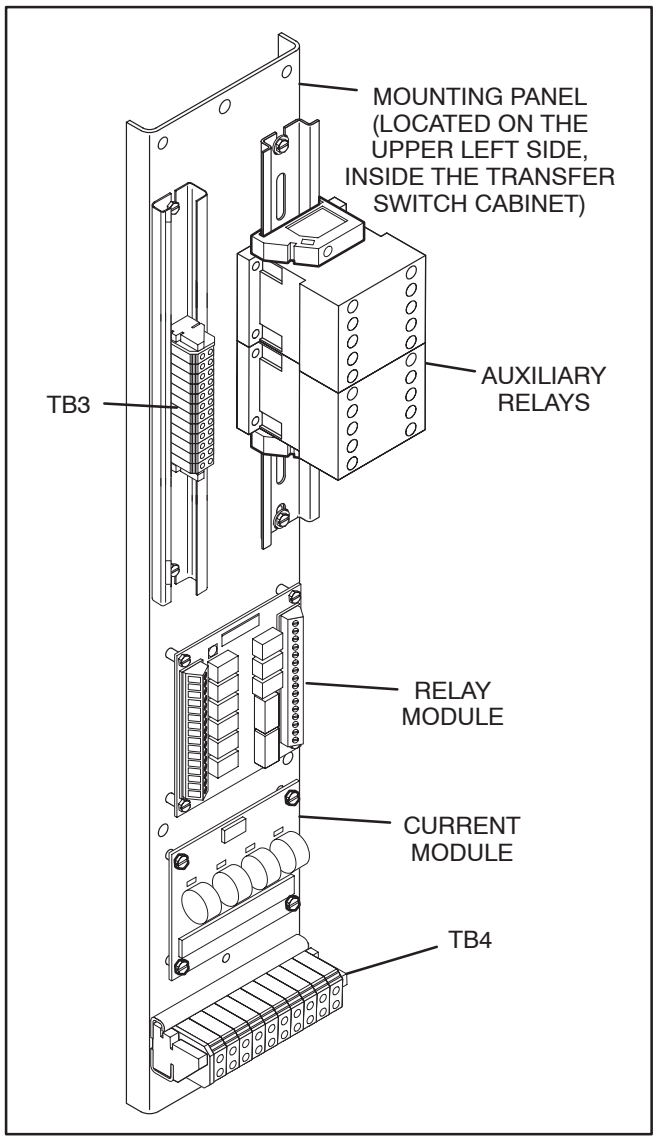

FIGURE 2-25. CONTROL WIRING CONNECTIONS

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 (see Table 2-1).The Relay Module is located on the left inside wall of the transfer switch enclosure. See Figure 2-25 for location in the enclosure and Figure 2-26 for details.

The module includes the Elevator Pre-Transfer Delay Signal. The relay contacts may be used with other applications.

TABLE 2-1. RELAY MODULE

Relay Signal	Control Type
Source 1 Connected	Level 1 and Level 2
Source 1 Available	Level 1 and Level 2
Source 2 Connected	Level 1 and Level 2
Source 2 Available	Level 1 and Level 2
Test/Exercise Active	Level 1 and Level 2
Transfer Switch Not In Auto	Level 1 and Level 2
Elevator Pre-Transfer	Level 1 and Level 2
Fail to Disconnect	Closed Transition Level 2
Fail to Synchronize	Level 2
Fail to Transfer/Retransfer	Level 2
Load Shed Active	Level 1 and Level 2

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. These relays are latching relays and will retain their last state in case of a complete loss of power.

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.

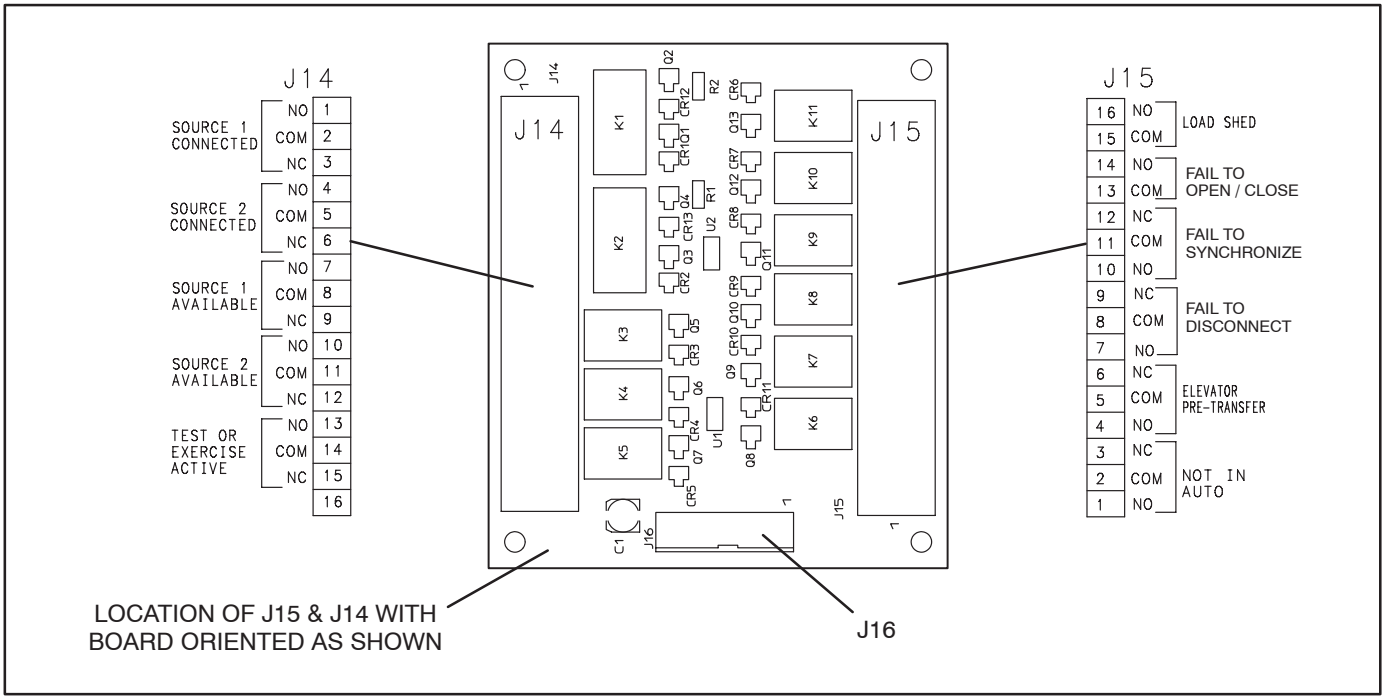

FIGURE 2-26. OPTIONAL RELAY MODULE

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

- Motor Disconnect Switch is set to Off
- Fail-to-Disconnect event is active
- Fail-to-Charge Spring event is active
- Control is locked out
- Wiring harness is disconnected from J12 on the Power Module
- Controller is set to Offline
- The Operator Release key switch is in the Unlocked (Manual) position – This only applies to models that include the optional external manual operation handle.

The **Elevator Pre-Transfer Delay** Signal delays transfer (or retransfer) for a specified time to give warning to an elevator control that a transfer (or retransfer) is about to occur.

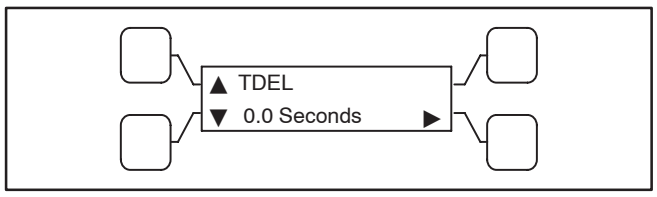

FIGURE 2-27. TDEL SUB-MENU

This time delay (TDEL) is adjustable over a range of 0 to 60 seconds. The default value is 0 seconds. The value is set with the PC Service tool or the digital display (see Figure 2-27) when it is available.

The **Fail to Disconnect** fault is used only in closed transition modes. The relay is energized whenever the two sources remain parallel longer than a set time limit.

The **Fail to Synchronize** relay is energized when the two power sources did not come into synchronicity (frequency, voltage, phase) within a two-minute limit; during a transfer between two live sources.

The **Fail to Transfer**/**Retransfer** relay is energized whenever the transfer switch does not *open* or *close* within a set time interval after the command to transfer or retransfer.

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

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3. Operation

TIME DELAYS

Transfer Times

The controller senses and records the time it takes for the transfer switch to break from one source and reconnect to the other source (see page 4-6).

The controller keeps track of open transition transfer times and provides an average open transition transfer time. The controller records the transfer time if the transition mode is an open transition with Sync Check or when a Programmed Transition is used and the Programmed Transition time delay is zero.

The controller also keeps track of closed transition transfer times.

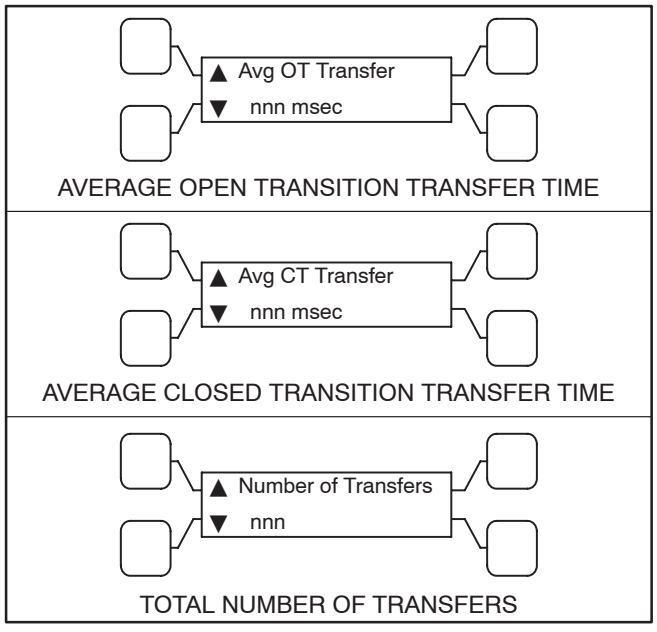


FIGURE 3-1. TRANSFER SUB-MENUS

Time Delay Engine Start (TDESa and TDESb)

This start time delay is adjustable from 0 to 15 seconds in 1 second increments on Level 1 controls. This start time delay is adjustable from 0 to 120 seconds on Level 2 controls. Values up to 20 seconds are adjustable in 1 second increments; values over 20 seconds are adjustable in 5 second increments. The default value is 3 seconds for both. For long engine start time delays (over 15 seconds) a remote battery source should be used.

This brief time delay prevents the generator set from starting during short power interruptions. Timing starts at the Source 1 power interruption. If the duration of interruption exceeds the delay time, the control system starts the generator. The value is set with the PC Service tool or the digital display (see page 4-14) when it is available.

For genset-to-genset applications, TDESa is the start time delay to start the Source 2 genset and TDESb is the start time delay to start the Source 1 genset.

For utility-to-utility applications, TDESa and TDESb are not available.

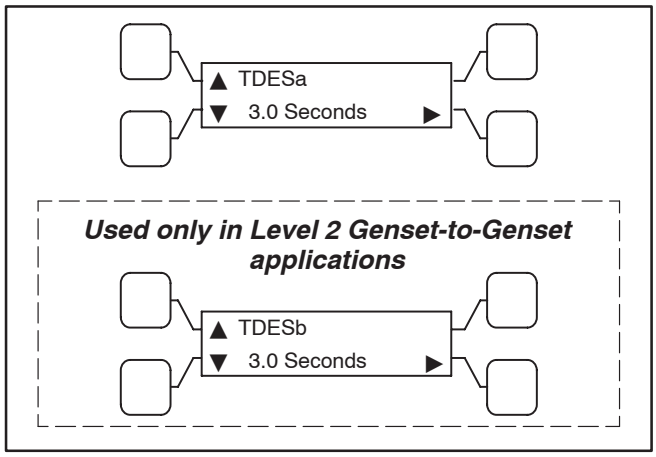


FIGURE 3-2. TDESa AND TDESb SUB-MENUS

Time Delay Engine Cooldown (TDECa, and TDECb)

This stop time delay is adjustable from 0 to 30 minutes in 1 minute increments. The default value is 10 minutes.

For utility-to-genset applications, it begins timing when the load is retransferred to Source 1.

For genset-to-genset applications, TDECa is the stop time delay to stop Source 2 genset and TDECb is the stop time delay to stop Source 1 genset.

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 the PC Service tool or the digital display (see page 4-14) when it is available.

For utility-to-utility applications, TDECa and TDECb are not available.

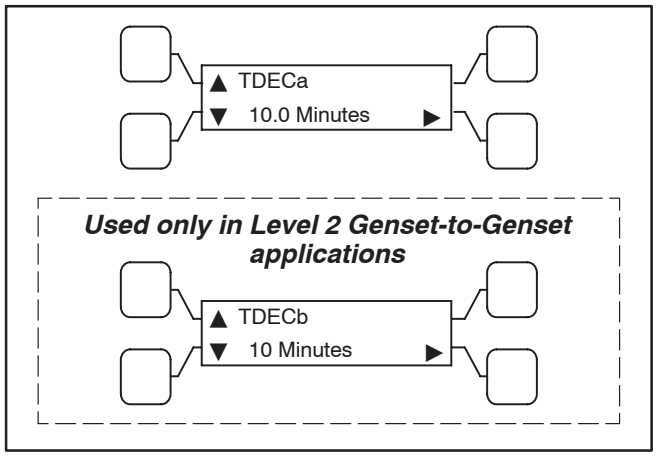


FIGURE 3-3. TDECa AND TDECb SUB-MENUS

Time Delay Normal to Emergency (TDNE)

This transfer time 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 (see page 4-14) when it is available.

TDNE is the delay from preferred source to backup source in utility-to-utility and genset-to-genset applications.

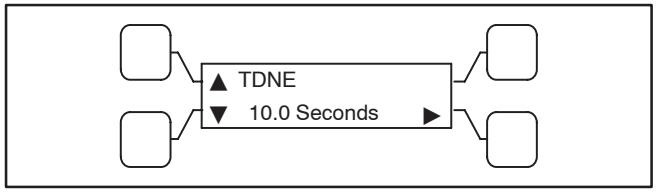


FIGURE 3-4. TDNE SUB-MENU

Time Delay Emergency to Normal (TDEN)

This retransfer time 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 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 (see page 4-14) when it is available.

TDEN is the delay from backup source to preferred source in utility-to-utility and genset-to-genset applications.

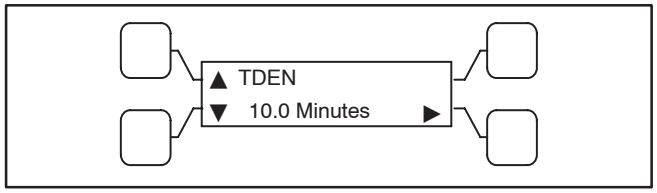


FIGURE 3-5. TDEN SUB-MENU

Programmed Transition (TDPT)

Programmed Transition introduces a delay (TDPT) during transition of the switch. Programmed transition stops the switch in the neutral position for an adjustable interval of time. In this position, the load is not connected to either Source 1 or 2. This delay allows residual current from inductive loads to decay to an acceptable level before transfer is completed.

The length of time that the transfer switch is in the neutral position can be adjusted from 0 to 60 seconds in 1 second increments. The default value is 0 seconds. The proper adjustment is a function of the load. This feature is enabled by default. The values are set with PC Service tool or the digital display (see page 4-14).

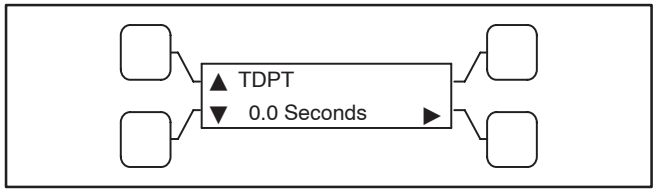


FIGURE 3-6. TDPT SUB-MENU

Elevator Time Delay (TDEL)

Used in elevator applications, this delay sets a time to wait for an elevator pre-transfer signal. This signal allows the elevator to come to a complete stop before the switch transfers. The adjustable range is 0 to 60 seconds. The time delay begins when a transfer or retransfer signal has been sent to the relays. The default value is 0. The value can be set using the PC Service tool or the digital display (see page 4-14).

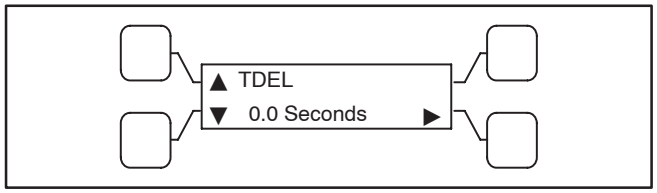


FIGURE 3-7. TDEL SUB-MENU

TEST WITH OR WITHOUT LOAD

The operator can test the transfer switch, generator, and power system locally. The operator can transfer the load during the test or only test the generator. Both hardware means (switch panel push button) and software means (PowerCommand network) can activate a test sequence. See page 4-16 for information on how to set the Test Switch on the front panel to test with or without load using the digital display.

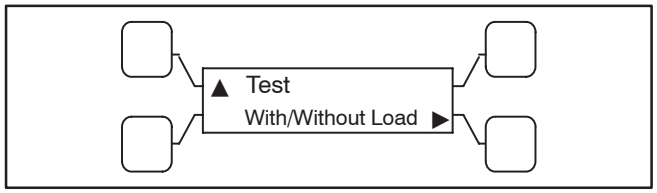


FIGURE 3-8. TEST WITH OR WITHOUT LOAD SUB-MENU

Generator Set Start Test With Load

This test is used with utility-to-genset applications only.

1. Verify that the transfer switch is set to Test With Load (see page 4-16 in the Digital Display Menu System section or the PC Service tool for details).

   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 two seconds. The generator set starts after the start time delay and assumes the load after the transfer time delay.

3. At the end of the test period, press the Test switch again. To bypass the retransfer time delay and cause immediate load retransfer, press the Override switch. The generator stops after the stop time delay.

Generator Set Start Test Without Load

This test is used with utility-to-genset applications only.

1. Verify that the transfer switch is set to Test Without Load (see page 4-16 in the digital display Menu System section or the PC Service tool for details).

   The Test With/Without Load variable must be set to the Without Load value in order to test without load.

2. Press and hold the Test switch for two seconds. The generator set starts and runs after the start time delay.

3. At the end of the test period, press the Test switch again. The generator cools down and stops.

REAL-TIME CLOCK

The clock must be set in order to maintain an accurate log of events and exercises. The correct date and time can be set with the PC Service tool or with the digital display (see Figure 3-9).

To set the clock using the digital display:

1. Using the digital display, navigate to the Setup sub-menu (see page 4-8) and enter the password (574).

2. Navigate to the Clock sub-menu (see pages 4-9 and 4-22) and program the clock.

   a. Set the date – Month (January = 1, December = 12), Date (1–31), and Year (1–9999).

   b. Enter the time – Hours (0–23), Minutes (0–59, and Seconds (0–59).

   c. Enable/Disable Daylight Savings time. Adjusts clock setting for daylight savings time. The default is “Disabled.”

      The Daylight Savings Time program is set for North America.

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

      If you are anywhere outside of North America, Daylight Savings Time should be disabled.

NOTE: If the batteries are weak or not in place during a power failure, the clock will need to be reset.

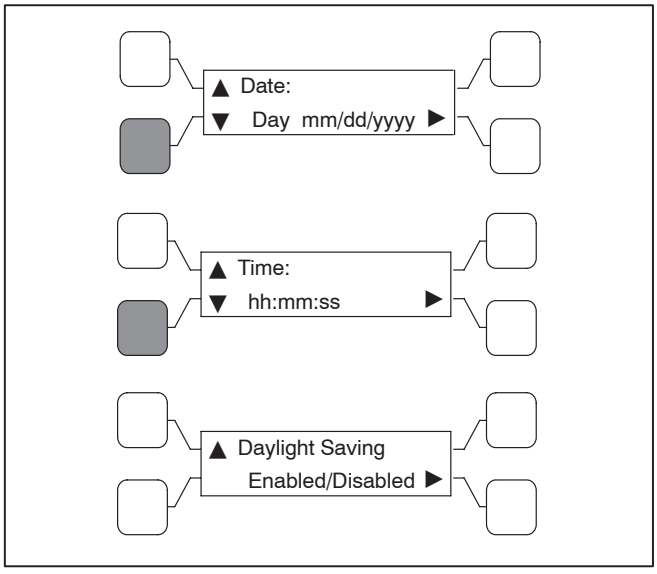


FIGURE 3-9. CLOCK SUB-MENUS

PROGRAMMABLE GENERATOR SET EXERCISES

Exercise the generator set for at least 30 minutes once every four weeks with at least one-third rated load (if possible). If you do not want to use the exerciser, use the Test switch on the front panel to manually test the generator set. Generator set exercising and Testing are only available with utility-to-genset applications.

The exerciser can be programmed for specified exercise periods and is used to exercise the generator set automatically with or without load. If Source 1 has an interruption while the generator set is exercising without load, the automatic transfer switch transfers the load to the generator set. The PC Service tool is required to set the exercise parameters on transfer switches without the digital display.

For Level 2 controllers, the digital display (see page 4-17) can set parameters for two exercise periods and two exceptions and the PC Service tool can set parameters for eight exercise periods and eight exceptions.

For Level 1 controllers, the digital display can set one exercise period and one exception.

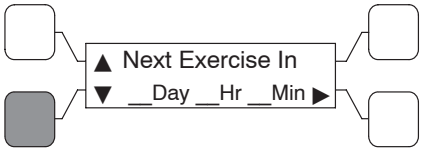
Setting Exercise(s)

Menus needed to set up exercise(s) are shown in Figure 3-10). To set up an exercise using the digital display:

1. Using the digital display, navigate to the the Setup sub-menu (see page 4-8) and enter the password (574).

2. Navigate to the Exercise sub-menus (see pages 4-9 and 4-17) and set exercise(s):

   NOTE: If any exercises are enabled, the “Next Exercise In” sub-menu will display the time remaining until the next exercise cycle begins. If no exercises are enabled, the message “No Next Exercise” is displayed.



   a. Select “Enabled” to enable an exercise.

   b. Select a day between Sunday and Saturday.

   c. Enter the time of day the exercise cycle is to begin (hr = 0–23, mn = 0–59).

   d. Set the duration the exercise cycle will run (hr = 0–23, mn = 0–59).

   e. 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).

   f. 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. See “Setting Exercise Exception(s)” on page 3-6.

3. Exit the Setup sub-menus and select “Save changes” to save the changes made to the Exercise sub-menus (see page 4-10).

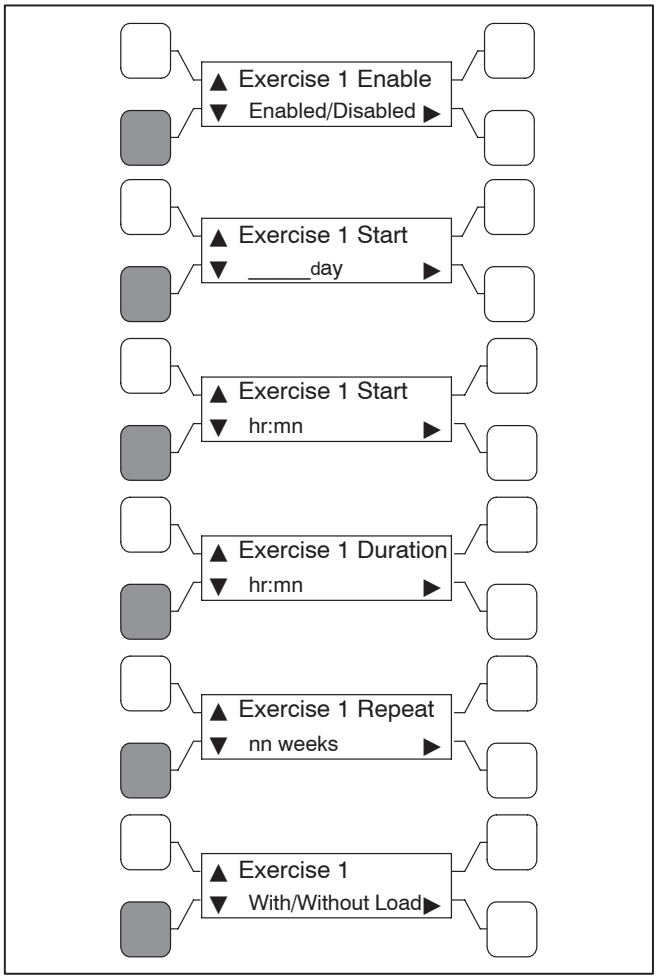


FIGURE 3-10. EXERCISE SUB-MENUS

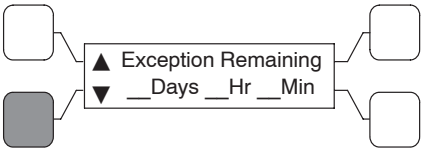
Setting Exercise Exception(s)

Menus needed to set up exercise exception(s) are shown in Figure 3-11). To set up an exercise exception using the digital display:

1. Complete the setup of exercise(s) as described on page 3-5.

2. Navigate to the Exercise Exceptions sub-menus (see Figure 4-15) and set exercise exception(s).

   NOTE: If any exercise exceptions are enabled, the "Exception Remaining" sub-menu displays the time remaining for the exception of the longest duration. If no exercise exceptions are enabled, the message "No Excepts Active" is displayed.



   a. Select "Enabled" to enable an exercise exception.

   b. Enter a starting month and day that you do not want the exercise to run (mo = 1–12, dy = 1–31).

   c. Enter a starting time that you do not want the exercise to run (hr = 0–23, mn = 0–59).

   d. Enter the length of time that you want the exception to override the exercise (days = 1–31, hr = 0–23, mn = 0–59).

   e. Select whether or not you want the exception to repeat. Select "Disabled" if you want the exception to occur only once. Select "Enabled" if you want the exception to repeat once a year.

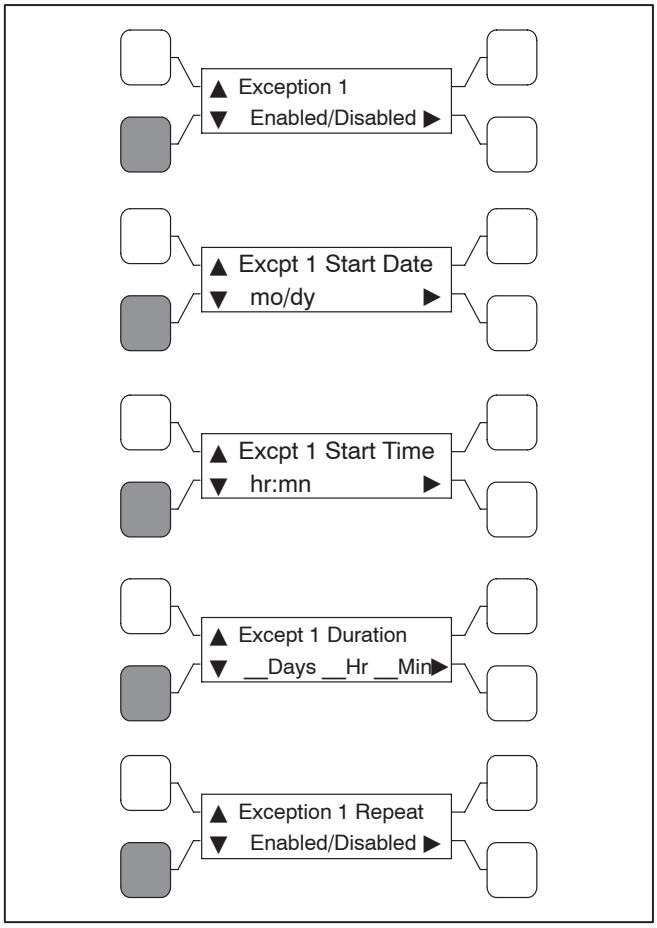
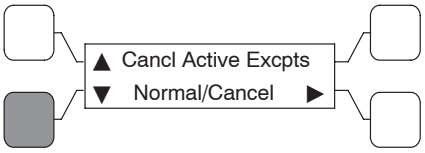


FIGURE 3-11. EXERCISE EXCEPTIONS SUB-MENUS

NOTE: Exercise exceptions can be cancelled in the "Cancl Active Excpts" sub-menu (change from "Normal" to "Cancel" to cancel all exceptions).



3. Exit the Setup sub-menus and select "Save changes" to save the changes made to the Exercise sub-menus (see page 4-10).

SENSORS

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 0.0 to 4.0 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 (see page 4-11) when it is available. See Figure 3-12 for an example using the default values.

NOTE: In utility-to-genset applications, it may be necessary to increase the under-voltage dropout time delay in order to allow for the genset recovery time after load acceptance.

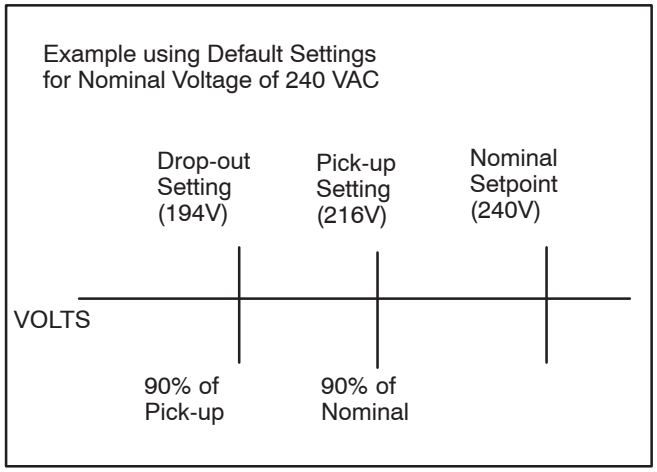


FIGURE 3-12. UNDER-VOLTAGE SENSING

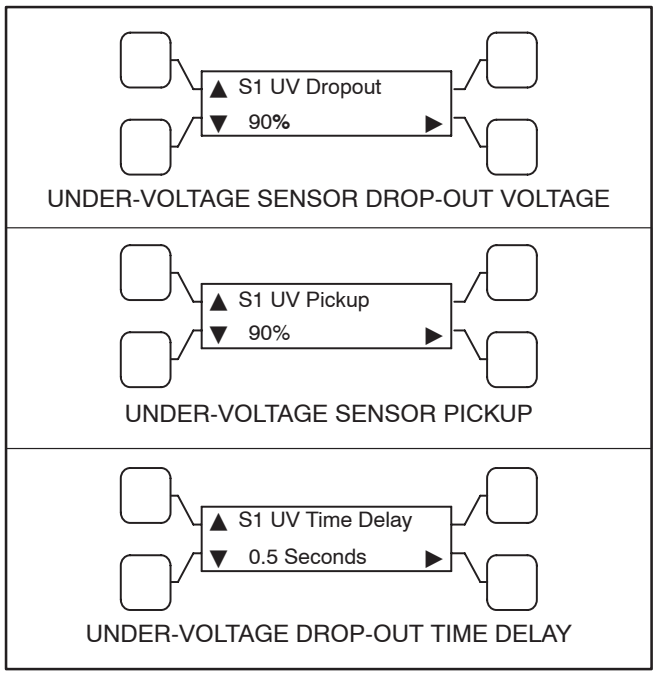


FIGURE 3-13. UNDER-VOLTAGE SENSING SUB-MENUS

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 99% of the drop-out setting. The default value is 95%. The adjustable range for the delay time period is 0.0 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 (see page 4-11) when it is available. See Figure 3-14 for an example using the default values. This feature can also be disabled.

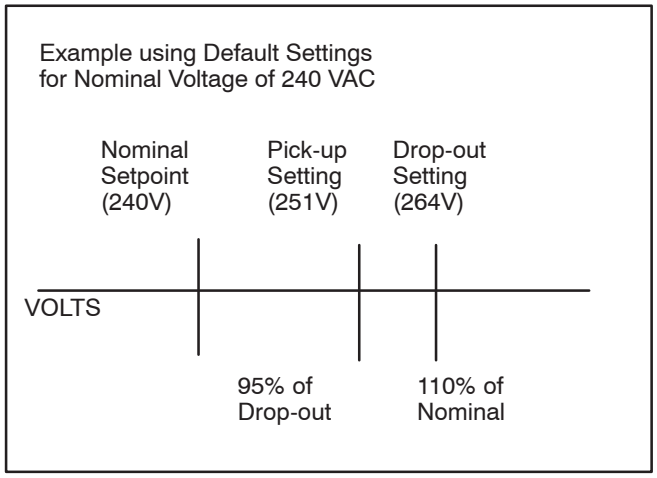


FIGURE 3-14. OVER-VOLTAGE SENSING

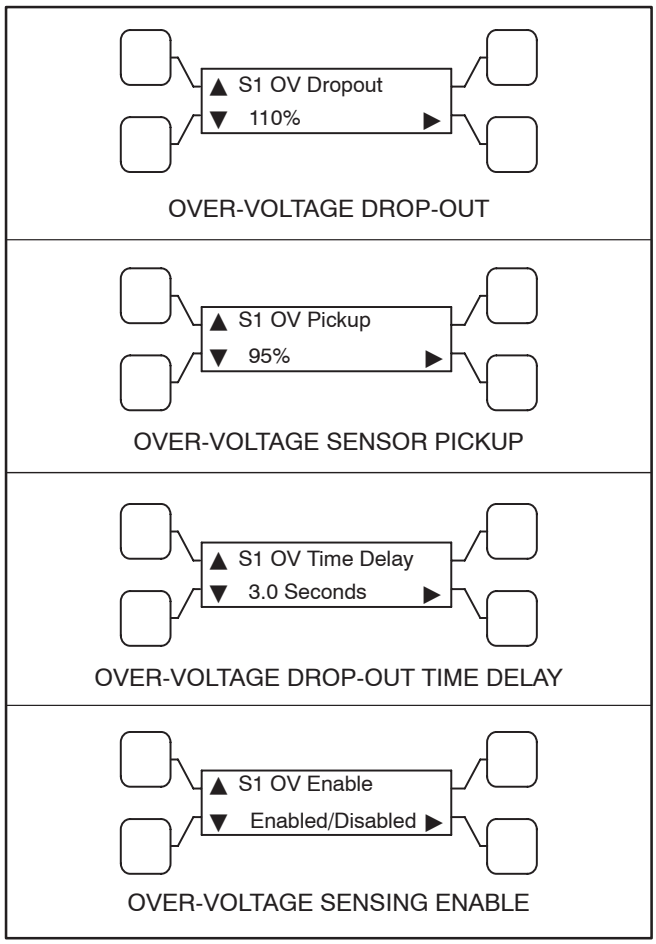


FIGURE 3-15. OVER-VOLTAGE SENSING SUB-MENUS

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% (dropout) of the average voltage in 1% increments. The pickup value is fixed at 10% of the dropout. The time delay for the imbalance sensor drop-out is adjustable (2–20 seconds).

This sensor can be enabled using the the PC Service tool or the digital display (see page 4-12) when it is available. 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.

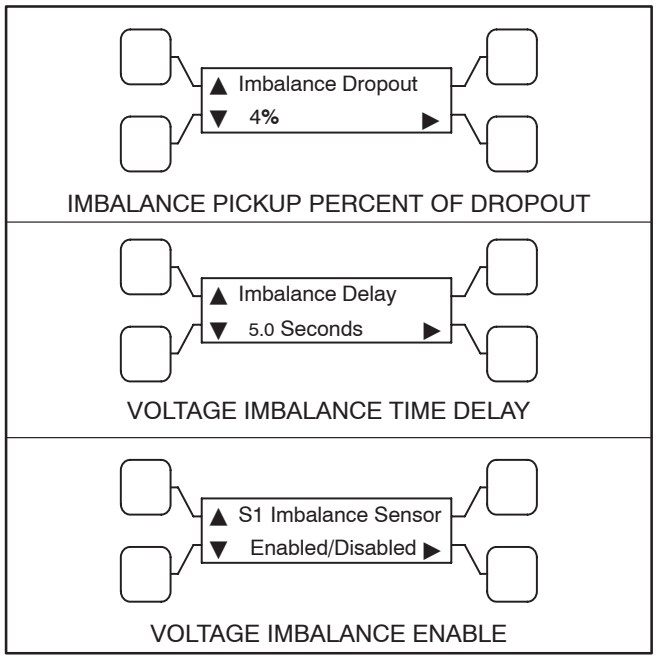


FIGURE 3-16. VOLTAGE IMBALANCE SUB-MENUS

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. The sensor can be disabled using the PC Service tool or the digital display Setup sub-menus (see page 4-12).

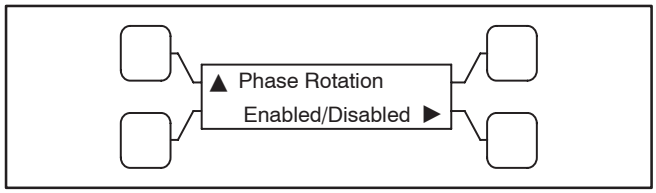


FIGURE 3-17. PHASE ROTATION SENSING SUB-MENUS

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 degrees. This feature is mainly used to protect three phase devices, such as motors.

This sensor can be enabled using the PC Service tool or the digital display Setup sub-menus (see page 4-12). This sensor is inactive for single phase systems and indicates no failures.

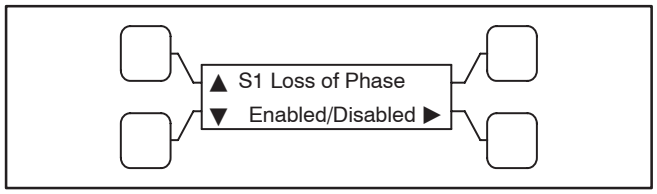


FIGURE 3-18. LOSS OF SINGLE PHASE SENSING SUB-MENU

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 second. The frequency sensing feature is enabled by default. These values are set with the PC Service tool or the digital display (see page 4-12). This feature can also be disabled.

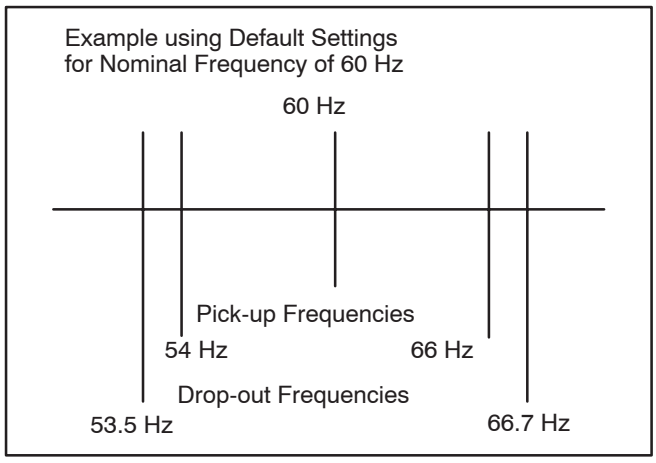


FIGURE 3-19. FREQUENCY SETTING

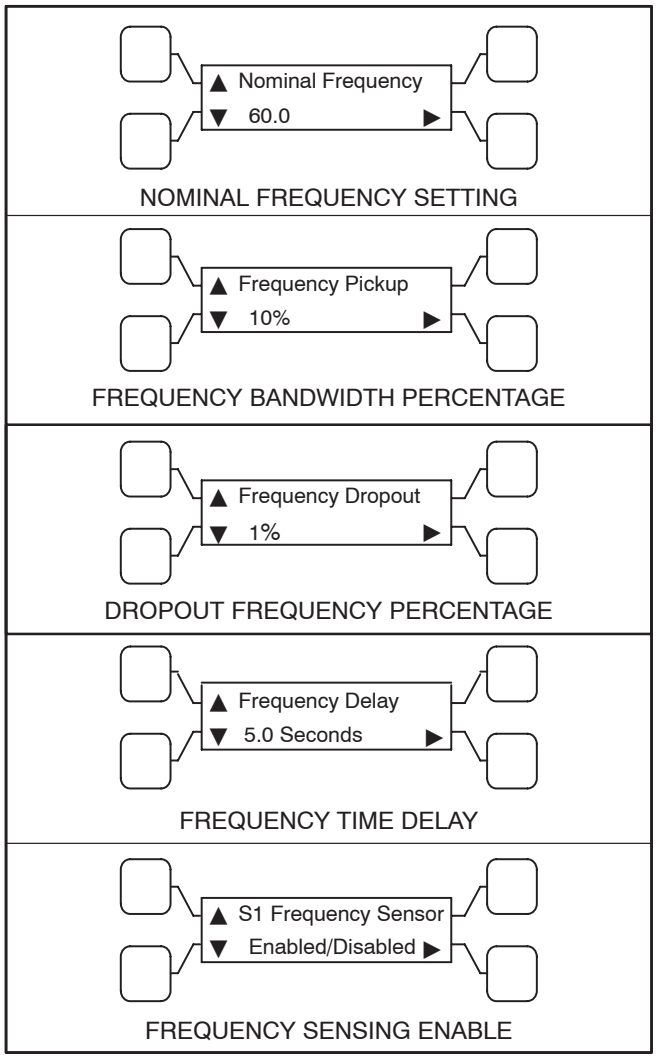


FIGURE 3-20. FREQUENCY SENSING SUB-MENUS

Sync Check Sensor

If enabled, the Sync Check sensor overrides programmed transition whenever transferring between two live sources. If only one power source is available, programmed transition overrides the Sync Check sensor.

The Sync Check sensor is disabled on OHPC transfer switches and enabled on CHPC transfer switches. The transfer switch mode setting can be changed with the PC Service tool or with the digital display (see page 4-21) when it is available.

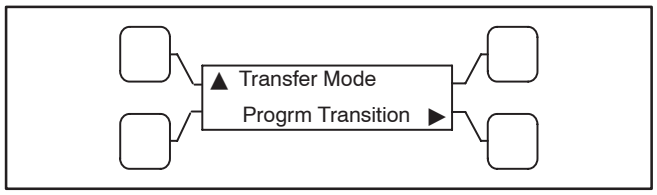


FIGURE 3-21. MODE SUB-MENU

Sync Check is used to determine when both sources of power are within specified tolerances of frequency, voltage, and relative phase difference. If both sources are within this range, a fast transfer occurs.

Synchronicity parameters are adjustable. The frequency bandwidth range is from 0.1 and 1.0 Hz. The default value is 1.0 Hz. The frequency difference between the sources must be equal to or less than the set value in order for transfer to occur. The voltage window is from 5 and 25 volts. The default value is 10 volts. The average voltage difference between the two sources must be equal to or less than the set value in order for transfer to occur. The manual offset range is from –25 to +25 milliseconds. The default value is 0 milliseconds. The transfer switch controller measures non-programmed transition transfer times from one source to another. It takes into account relay coils and solenoids energizing. These values can be set with the PC Service tool or with the digital display (see page 4-13) when it is available.

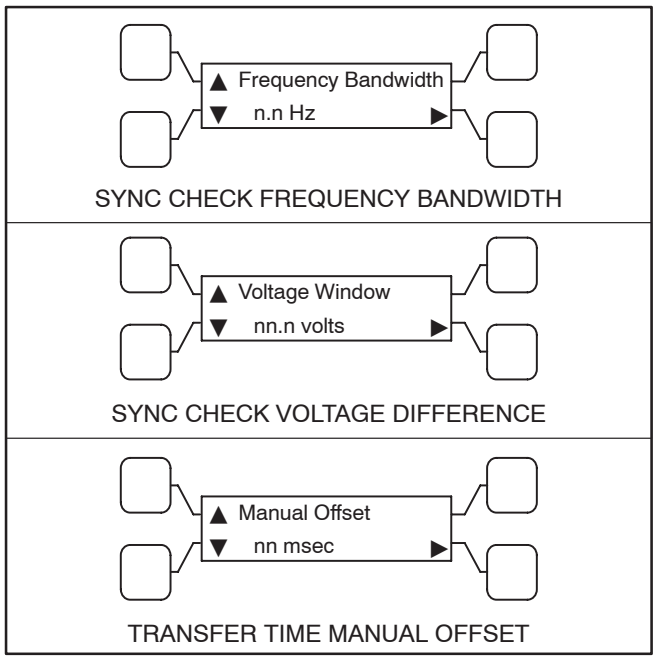


FIGURE 3-22. SYNCHRONICITY PARAMETER SUB-MENUS

Another feature included with controls that have a Sync Check sensor is the Return to Programmed Transition. If the two sources fail to synchronize within two minutes, a Failed to Synchronize event occurs. If the Return to Programmed Transition feature is enabled, the control reverts to transferring the transfer switch to the programmed transition mode. This feature can be enabled with the PC Service tool or with the digital display (see page 4-13) when it is available.

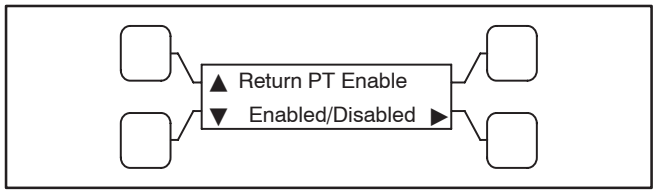


FIGURE 3-23. RETURN TO PROGRAMMED TRANSITION SUB-MENU

Active Sync Feature

If a PowerCommand transfer switch and a PowerCommand paralleling genset are used together, the transfer switch control can send a Sync Enable command to the genset to synchronize with the utility. This command is activated just before the Sync Check sensor is activated. When the genset control receives an Sync Enable command and detects the Source 1 bus voltages, the genset control automatically synchronizes its speed and phase to match the Source 1 bus. The Sync Check sensor monitors both sources. When they are synchronized, a transfer or retransfer command is initiated. **The genset must be capable of reacting to a Sync Enable command.**

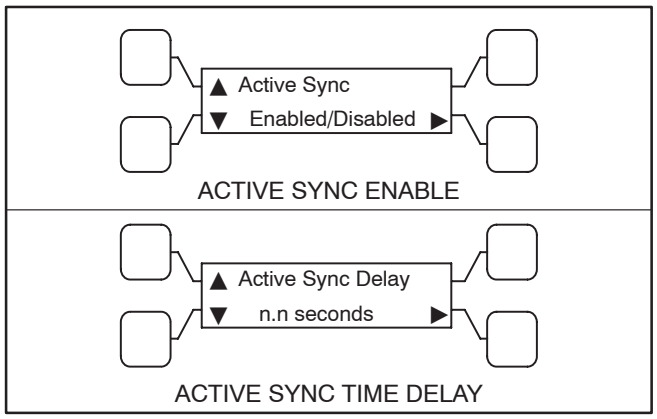


FIGURE 3-24. ACTIVE SYNC SUB-MENUS

To use the Active Sync feature, it must first be enabled. The Active Sync feature can be enabled with the PC Service tool or the digital display (see the Active Sync sub-menu on page 4-13).

When the Active Sync feature is enabled, the control runs an Active Sync Time Delay (if greater than 0) and sends the Sync Enable command to the genset. The Active Sync Time Delay is used to check the stability of the system before transferring to the other source. The two sources must remain synchronized for this period of time period before a transfer command is given. The Active Sync Time Delay is adjustable from 0 to 5 seconds in 0.1 second increments (default = 0.5 seconds). The Active Sync Delay timer can be set with the PC Service tool or the digital display (see page 4-13). **The Active Sync Delay should not be used unless the generator set is actively synchronized to the utility (for example, a paralleling genset). Contact your dealer or distributor for more information.**

Speed Adjust

If a PowerCommand transfer switch and a non-paralleling genset are networked together, the transfer switch control can send a Speed Adjust command to the genset to increase its speed just enough to increase its frequency by 0.5 Hz. The command is activated just before the Sync Check sensor is activated. It is used when the genset takes a long time to drift in sync with the utility. This increases the number of “in-phase” opportunities to satisfy the Sync Check sensor. Speed Adjust is always enabled unless the Active Sync is enabled. **The genset must be capable of reacting to a Speed Adjust command. This feature is only available if a PowerCommand network is installed.**

SLEEP MODE

After a period of screen inactivity (35 minutes), the digital display goes blank. Screen inactivity is when there is no user interaction with the menu system and when there are no events. The digital display is reactivated when an event occurs or when an operator touches one of the menu buttons.

In order to conserve controller battery power, the loss of both power sources also causes the digital display to go blank. The digital display is reactivated when one of the AC power source becomes available.

UTILITY-TO-UTILITY CONTROL MODE

Level 2 controllers can control a two-utility configuration for prime power. One utility is designated the preferred source. The default preferred source is Source 1 but it can be changed to Source 2 through the front panel display (see page 4-16) or the PC Service tool. The control automatically transfers the load between the two utilities. The exerciser is not available in this configuration.

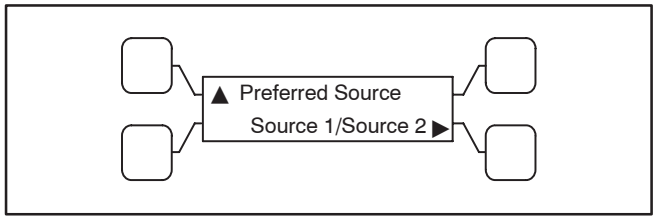


FIGURE 3-25. PREFERRED SOURCE SUB-MENU

GENSET-TO-GENSET CONTROL MODE

A Level 2 controller can control a two-generator configuration for either dual standby or prime power. One generator is designated the preferred source. The control automatically transfers the load to the backup genset if the preferred genset fails.

A separate changeover timer (typically used in prime power genset-to-genset applications) automatically transfers loads between the two generators. The changeover timer is set from the digital display or the PC Service tool. The exerciser is not available in this configuration.

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.

The default preferred source is Source 1. At any time, the PC Service tool or the Test sub-menu (see page 4-16) 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.

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 (see page 4-14) under Setup or the PC Service tool to change the settings.

Prime Power (Plant to Plant) Operation

In prime power applications (see Figure 3-26), 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.

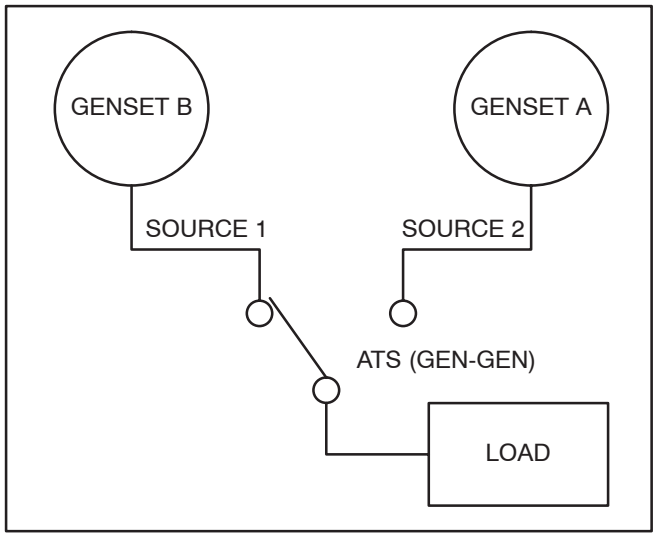


FIGURE 3-26. PRIME POWER OPERATION

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.

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 (see page 4-15) 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.

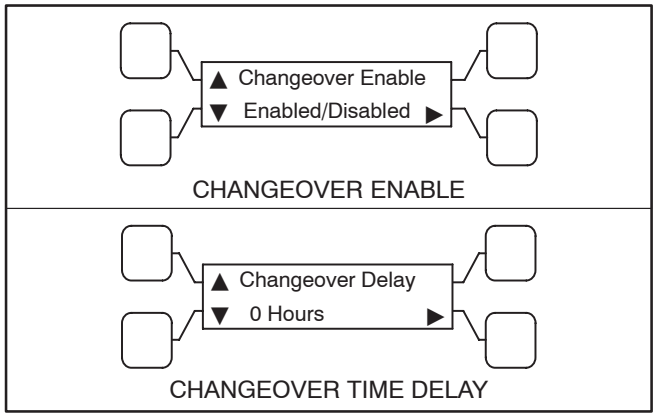


FIGURE 3-27. AUTOMATIC CHANGEOVER SUB-MENUS

Dual Stand-By Operation

In dual stand-by applications (see Figure 3-29), 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. Time Delay Engine Start (TDES) and Time Delay Engine Cooldown (TDEC) are set to zero in the utility-to-genset ATS.

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 (see page 4-16) on the genset-to-genset transfer switch can be used to set the preferred source.

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 lead transfer switch senses the return of utility power, it initiates a retransfer sequence and transfers the load back to the utility. The lead switch sends a signal to the genset-to-genset switch to shut down the genset.

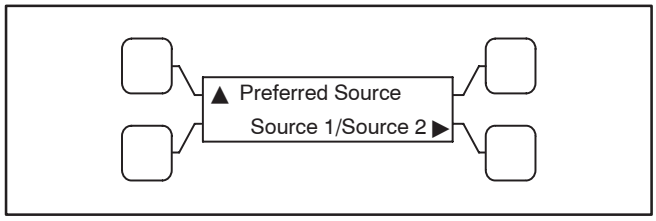


FIGURE 3-28. PREFERRED SOURCE SUB-MENU

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.

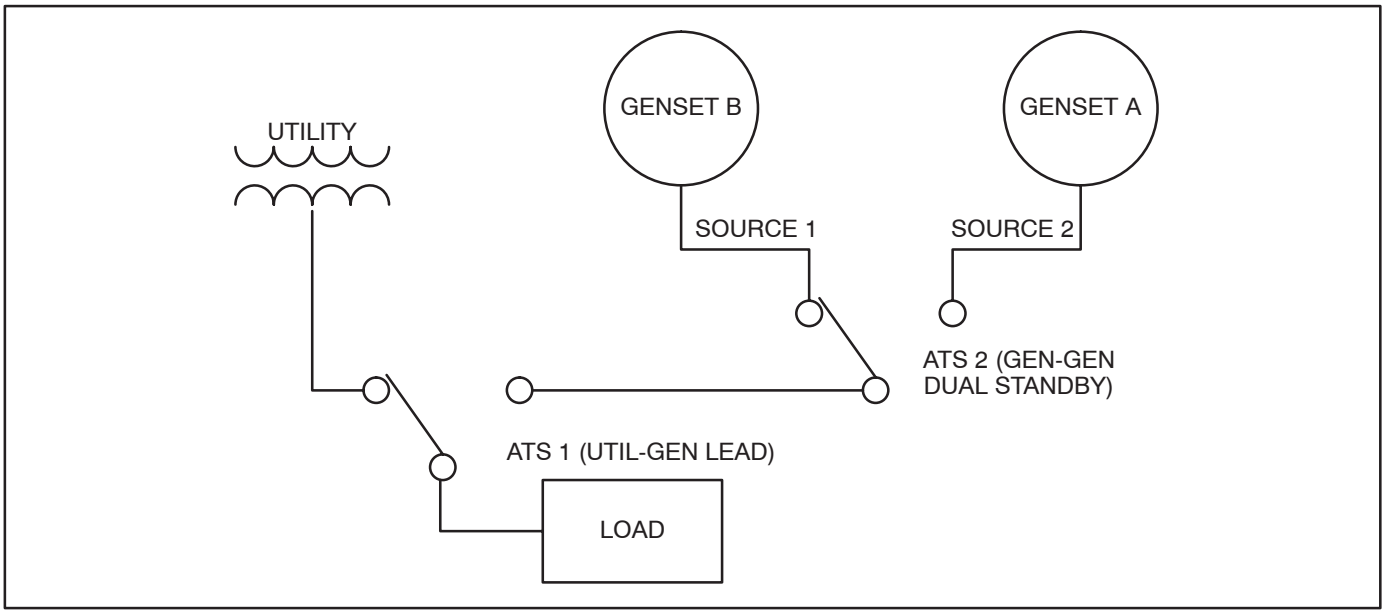


FIGURE 3-29. DUAL STAND-BY OPERATION

AUTOMATIC OPERATION

Place control switches in the positions given below.

- **Motor Disconnect Switch:** Auto position.
- For utility-to-genset and genset-to-genset configurations, the generator set control must also be set for automatic (Auto) operation.
- For models that include the optional external manual operation handle, the Operator Release key switch must be in the Locked (Auto) position.

For transfer switches equipped with the Digital Display, read through the Section 4 (Digital Display Menu System) and become familiar with its use.

MANUAL OPERATION

The manual operation handles are located on the transfer switch actuator (see Figure 3-30). Some models also include an optional external manual operation handle.

Before manually transferring the transfer switch, the switch position needs to be verified. If power is available, look at the Source 1/Source 2 Connected lights on the front panel. If no power is available and the lights are not lit, open the transfer switch door and look at the switch position indicators on the actuator (see Figure 3-30). If the transfer switch is connected to Source 1, the Source 1 indicator will read CLOSED and the Source 2 indicator will read OPEN.

⚠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.***

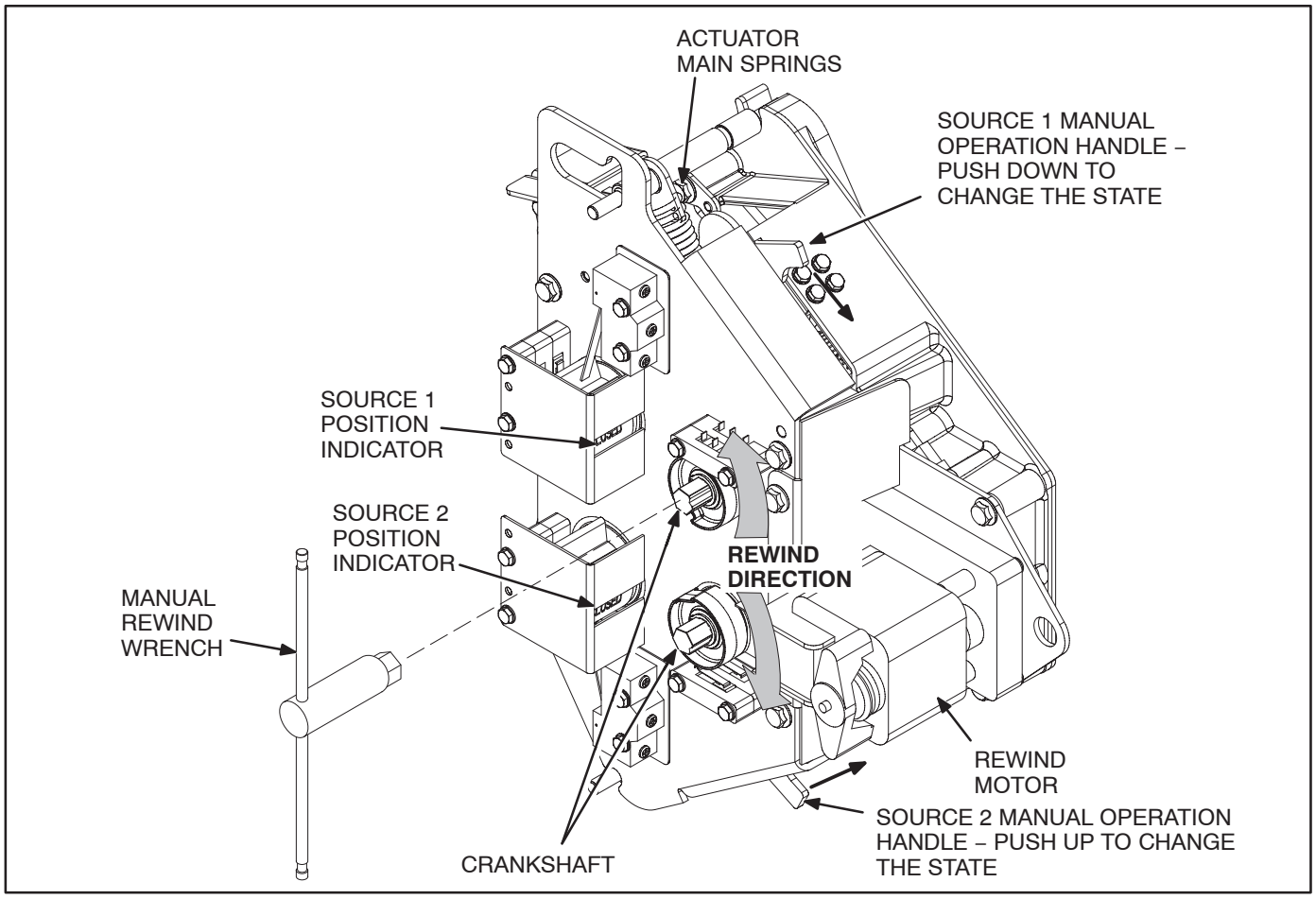


FIGURE 3-30. RECHARGING THE SPRINGS MANUALLY

Manual Operation Without the Optional External Manual Operation Handle

⚠WARNING ***The transfer switch presents a shock hazard that can cause severe personal injury or death unless all AC power is removed. Be sure to set the genset operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [–] lead first) before servicing. Be sure to wear safety glasses when servicing the transfer switch.***

If the automatic transfer switch is not equipped with an optional external manual operation handle on the transfer switch door, manual operation handles on the actuator inside the cabinet can be used to manually operate the switch. Manual operation with the transfer switch door open must be performed by qualified personnel as described below under **NO-LOAD CONDITIONS ONLY**.

⚠WARNING ***Manual operation of the transfer switch under load with the transfer switch door open presents a shock hazard that can cause severe personal injury or death. Do not attempt to operate the switch manually with the door open when it is under load. Follow the "Safety Related Work Practices" listed in NFPA 70E.***

Manually Transferring from Source 1 to Source 2

1. Remove both power sources.

   ⚠WARNING ***AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Disconnect both sources of power before using the manual operation handles.***

2. Open the cabinet door of the automatic transfer switch.
3. Move the Motor Disconnect Switch to the Off position.
4. Open Source 1 by moving the Source 1 Manual Operation handle down. If Source 1 did not open, the Source 1 actuator main spring assemblies must be charged (see *Manual Rewinding* on page 3-18).
5. Close Source 2 by moving the Source 2 Manual Operation handle up.
6. Before moving the Motor Disconnect Switch back to the Auto position, remember the transfer switch transfers the load to the active power source. (If both power sources are available, it transfers the load to the preferred source.)
7. Move the Motor Disconnect switch to the Auto position.
8. Reconnect power sources.
9. Close the cabinet door.

Manually Transferring from Source 2 to Source 1

1. Remove both power sources.

   ⚠WARNING ***AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Disconnect both sources of power before using the manual operation handles.***

2. Open the cabinet door of the automatic transfer switch.
3. Move the Motor Disconnect Switch to the Off position.
4. Open Source 2 by moving the Source 2 Manual Operation handle up. If Source 2 did not open, the Source 2 actuator main spring assemblies must be charged (see *Manual Rewinding* on page 3-18).
5. Close Source 1 by moving the Source 1 Manual Operation handle down.
6. Before moving the Motor Disconnect Switch back to the Auto position, remember the transfer switch transfers the load to the active power source. (If both power sources are available, it transfers the load to the preferred source.)
7. Move the Motor Disconnect switch to the Auto position.
8. Reconnect power sources.
9. Close the cabinet door.

Manual Rewinding

You may need to manually rewind the actuator charge springs to charge the actuator when:

- You wish to operate the switch but the actuator rewind motor has failed with the switch fully discharged
- You wish to operate the switch but no electrical power is available
- You wish to troubleshoot the actuator to verify it is operating correctly
- The Motor Disconnect switch is in the Off position.

If power is available and the Motor Disconnect switch is in the Auto position, the main springs will automatically charge if discharged. When fully charged, the two main spring assemblies are fully stretched.

If power is not available and the main spring assemblies are discharged, the crankshaft can be manually rewound using a manual rewind wrench.

⚠WARNING ***AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Disconnect both sources of power before manually rewinding the actuator charge springs.***

To manually rewind the crankshaft and charge the actuator main springs:

1. Retrieve the manual rewind wrench supplied with the transfer switch. It is located inside the transfer switch cabinet, lower left side.

2. Engage the manual rewind wrench with the end of the Source1 or Source 2 crankshaft (the top crankshaft is for Source 1; the bottom crankshaft is for Source 2). It works well to start with the handles straight up and down (see Figure 3-30).

   ⚠CAUTION ***The crankshaft is under tension. Manually rewinding the crankshaft can result in personal injury. Carefully follow the directions and wear protective gloves and eyewear during the rewind operation. Turning the crankshaft in the wrong direction can result in the rewind mechanism being damaged.***

3. Rotate the manual rewind wrench counterclockwise for the Source 1 crankshaft or clockwise for the Source 2 crankshaft until the spring is fully charged and snaps into position. You will need to rotate the wrench more than 180 degrees. When the spring is locked into position, you will notice that the spring is no longer trying to force the handle backwards.

   NOTE: Sometimes you may notice extra resistance before the spring is fully charged. Continue applying force until the spring locks into position and the handle no longer pushes back.

4. Store the manual rewind wrench inside the transfer switch cabinet. Make sure the manual rewind wrench is properly stored before proceeding.

Manual Operation With the Optional External Manual Operation Handle

Automatic transfer switches that are equipped with an optional external manual operation handle located on the transfer switch door (see Figure 3-31) can be manually operated without opening the cabinet door.

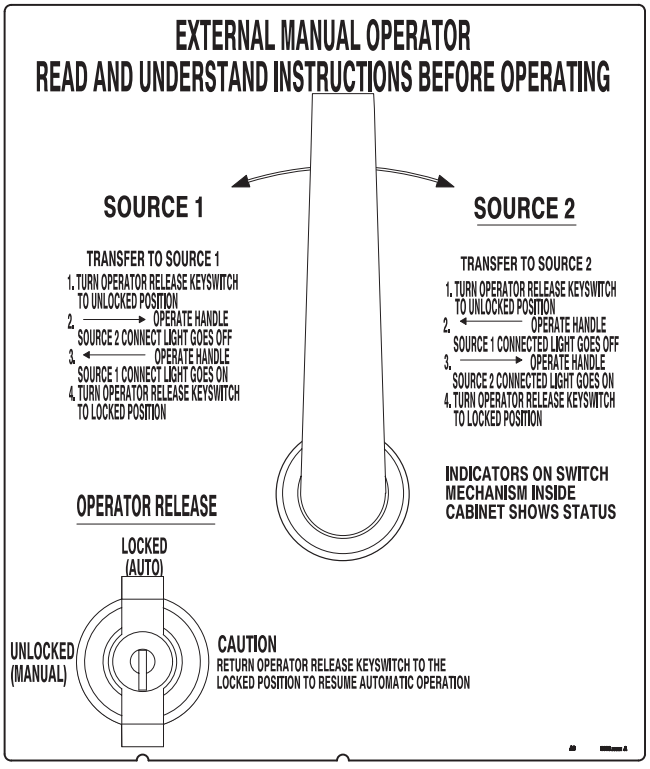


FIGURE 3-31. MANUAL OPERATOR HANDLE

Manually Transferring from Source 1 to Source 2

1. Unlock the manual operator by turning the Operator Release key switch to the Unlocked (Manual) position. This places the control in the Not In Auto mode. The Not In Auto light on the control panel will be blinking.

2. Open Source 1 by rotating the manual operator handle counterclockwise to the Source 1 position. You will hear Source 1 open and the Source 1 Connected light on the control panel will go off.

3. Release the manual operation handle; the handle is spring-controlled and will return to the center (vertical) position.

4. Close Source 2 by rotating the manual operator handle clockwise to the Source 2 position. You will hear Source 2 close and the Source 2 Connected light on the control panel will go on.

5. Release the manual operation handle; the handle is spring-controlled and will return to the center (vertical) position.

6. If you want the transfer switch to return to automatic operation, turn the Operator Release key switch to the Locked (Auto) position. The Not In Auto light will go out. If Source 1 is the preferred source and it is available, the transfer switch will automatically transfer to it.

   If you want to continue using Source 2, keep the lockout key switch in the Unlocked (Manual) position.

Manually Transferring from Source 2 to Source 1

1. Unlock the manual operator by turning the Operator Release key switch to the Unlocked (Manual) position. This places the control in the Not In Auto mode. The Not In Auto light on the control panel will be blinking.

2. Open Source 2 by rotating the manual operator handle clockwise to the Source 2 position. You will hear Source 2 open and the Source 2 Connected light on the control panel will go off.

3. Release the manual operation handle; the handle is spring-controlled and will return to the center (vertical) position.

4. Close Source 1 by rotating the manual operator handle counterclockwise to the Source 1 position. You will hear Source 1 close and the Source 1 Connected light on the control panel will go on.

5. Release the manual operation handle; the handle is spring-controlled and will return to the center (vertical) position.

6. If you want the transfer switch to return to automatic operation, turn the Operator Release key switch to the Locked (Auto) position. The Not In Auto light will go out. If Source 2 is the preferred source and it is available, the transfer switch will automatically transfer to it.

   If you want to continue using Source 1, keep the lockout key switch in the Unlocked (Manual) position.

PLANNED MAINTENANCE

Performing the annual planned maintenance procedures increases reliability of the transfer switch.

The following procedures must only be done by trained and experienced personnel, according to procedures in the *OHPC/CHPC Service Manual* (962–0520). If repair or component replacement is necessary, call your dealer or distributor.

⚠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. Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. All corrective service procedures must be done only by technically qualified personnel, according to procedures in the OHPC/CHPC Service Manual.***

⚠WARNING ***The transfer switch presents a shock hazard that can cause severe personal injury or death unless all AC power is removed. Be sure to set the genset operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [–] lead first) before servicing.***

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

1. **Disconnect All Sources of AC Power:**

   a. Disconnect both AC power sources from the transfer switch before continuing. Turn the generator set operation selector switch to Stop. (The selector switch is located on the generator set control panel.)

   b. ***If there is an external battery charger, disconnect it from its AC power source.*** Then disconnect the set starting battery (negative [–] lead first).

2. **Clean**

   a. Thoroughly dust and vacuum all controls, meters, switching mechanism components, interior buswork, and connecting lugs.

   b. Close the cabinet door and wash **exterior** surfaces with a damp sponge (mild detergent and water). ***Do not allow water to enter the cabinet.***

3. **Inspect**

   a. Check buswork and supporting hardware for carbon tracking, cracks, corrosion, or any other types of deterioration. If replacement is necessary, call your dealer or distributor.

   b. Check system hardware for loose connections. Tighten as indicated in step 4.

   c. Check all control wiring and power cables (especially wiring between or near hinged door) for signs of wear or deterioration.

   d. Check all control wiring and power cables for loose connections. Tighten as indicated in step 4.

   e. Check the cabinet interior for loose hardware. Tighten as indicated in step 4.

4. **Perform Routine Maintenance**

   a. Tighten buswork, control wiring, power cables, and system hardware, as necessary. Hardware torque values are given in section 4 of the *OHPC/CHPC Service Manual*. Retorque all cable lug connections. Lug torque requirements are listed in section 1 of the Service manual.

   b. Replace the batteries (3V lithium) in the Digital Module and the Network Module (if applicable) every two years (see Figures 2-5).

5. **Connect AC Power and Check Operation**

   a. Connect the set starting battery (negative [–] lead last). Connect the normal AC power source, enable the backup power source. If applicable, connect power to the battery charger.

   b. Verify proper operation of the battery charger.

   c. Test system operation as described in this section. Close and lock the cabinet door.

THERMOGRAPHY

Thermography is not a required part of the annual maintenance. Thermography is described here because it can be a useful part of an overall electrical system inspection.

A regular thermographic or infrared examination of transfer switches can be valuable in monitoring transfer switch condition and loading. A thermal evaluation will detect overheating due to not only failure or deterioration of components, but also overloading or the effects of nonlinear loads in the distribution system.

In general, thermographic evaluation is most useful when historical data is available for use in comparing current test data to samples of previous performance. Comparison of current performance to other contacts of identical or similar design with similar load levels, or between contacts of a single device will often highlight contacts that need further inspection or even repair.

If no historical data is available, test data can be evaluated based on maximum allowable temperatures allowed by UL standards. For transfer switches rated 400 amps and smaller, the lug assembly should be no more than 50°C over ambient with full load on the switch.

For transfer switches larger than 400 amps, the maximum temperature allowed is 60°C over ambient. Connecting straps and bus bar may operate at temperatures up to 65°C over ambient at full load.

Note that a thermographic evaluation does not take the place of the required yearly inspection and maintenance, but can highlight problems between service intervals, or indicate the certain need for repairs such as contact replacement which are not commonly required. The advance notice of the need to repair these components can prevent wasted time and unnecessary down time in the system for unplanned or additional shutdown periods.

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4. Digital Display Menu System

This section describes the Digital Display Menu System and navigation through the menus. This manual reflects the menus included in software version 1.12. Changes included in software updates may not be included in this manual.

NOTE: Software versions prior to 1.12 will not support OHPC/CHPC transfer switches.

The menus display status information, events, and setup menus. Setup menus contained 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. System menus can also be accessed with the InPower Service Tool.

The Digital Display Menu System includes 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 can be used to access screens and change 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 MENUS AND SUB-MENUS

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 nine sub-menus:

- Source 1
- Source 2
- Load
- Statistic
- Events
- Setup
- About
- System
- Active TD

Refer to Figure 4-22 at the end of this section for an overview of menu navigation. This illustration can also be used to locate a submenu and determine how to access it.

Source 1 and Source 2 Sub-Menus

Source 1 and Source 2 sub-menus display Line-to-Line (Level 1 and Level 2 controls) and Line-to-Neutral (Level 2 controls only) voltages, sensed line frequency, position of contactors, and total connection time. See Figure 4-3.

Load Sub-Menus

The Load sub-menus display is not available on Level 1 controls and is optional on Level 2 controls. These menus display load Line-to-Line voltages, Line-to-Neutral voltages, line currents, and sensed line frequency for the connected source. They also display real power, total apparent power, average power factor, and neutral current of the transfer switch. Unless a load module is installed, only voltage and frequency values are displayed. See Figure 4-4.

Statistic Sub-Menus

The Statistic sub-menus display total run times for each source, average transfer time, number of transfers, number of source failures, control battery status, status of optional battery charger, and controller board operation time. See Figure 4-5.

Events Sub-Menus

The Events sub-menus display information (up to 50 fault codes, active time delays, or significant power changes) about either source. See Figure 4-6.

Setup Sub-Menus

Before you can navigate and change setup parameters, you must enter a password (574); however, you can bypass the password and examine but not change parameters. When parameters are changed in any Setup menu, you are prompted to either save or cancel the changes. Setting and navigating through the password menus is described in Figures 4-7 through 4-9.

The Setup sub-menus include Sensor, Sync Check, Time Delay, Test, Exercise, Exercise Exceptions, Mode, Clock, and Load Sequencer submenus. See Figures 4-10 through 4-18.

About Sub-Menus

The About sub-menus display the switch name, software version, controller manufacturing date, ATS configuration, ATS type, board level, network module status, relay module status, and load current module status. See Figure 4-19.

System Sub-Menus

The System sub-menus display data from LonWorks® network devices (ATS, generator, and master control), if the transfer switch is connected to a network with a Network Communication Module. See Figure 4-20.

Active TD Sub-Menus

The Active TD sub-menus display information on any active time delays. See Figure 4-21.

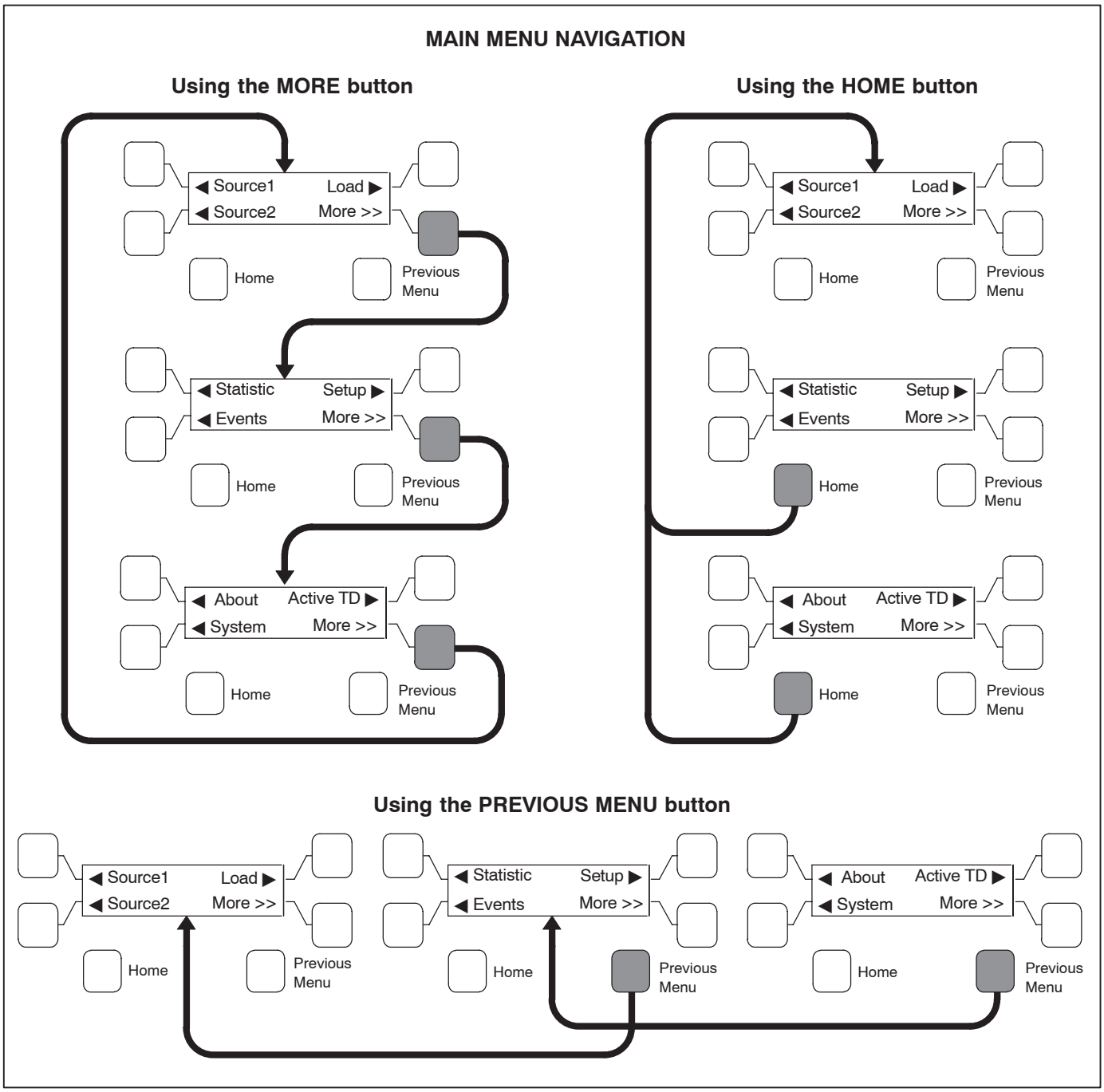
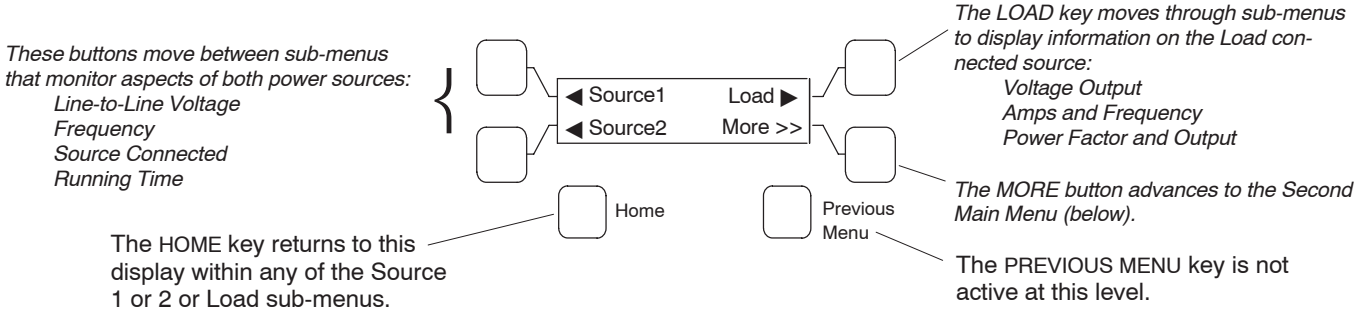


FIGURE 4-1. NAVIGATION

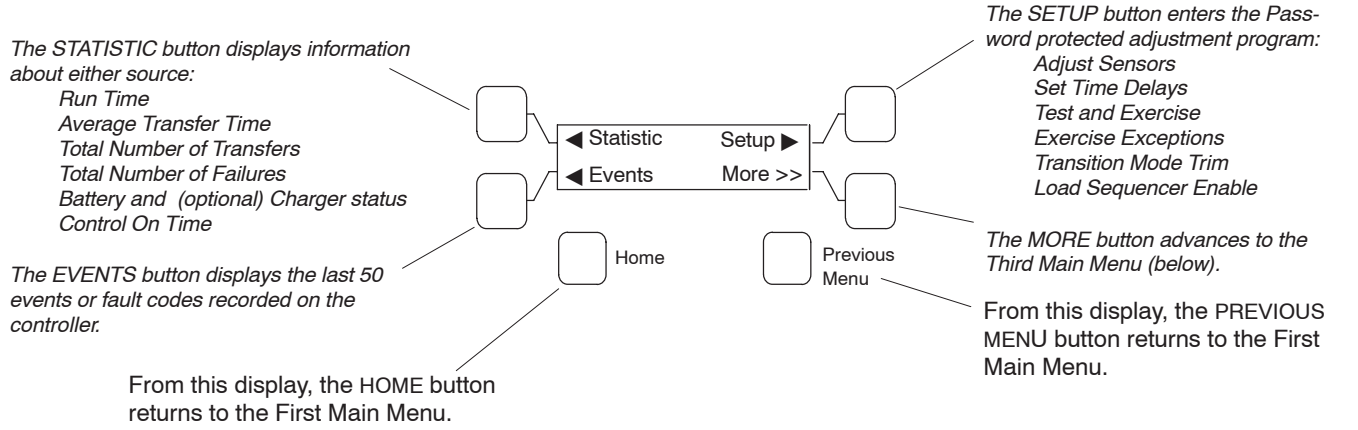
LonWORKS IS a registered trademark of Echelon Corporation.

MAIN MENU DESCRIPTIONS

FIRST MAIN MENU



SECOND MAIN MENU



THIRD MAIN MENU

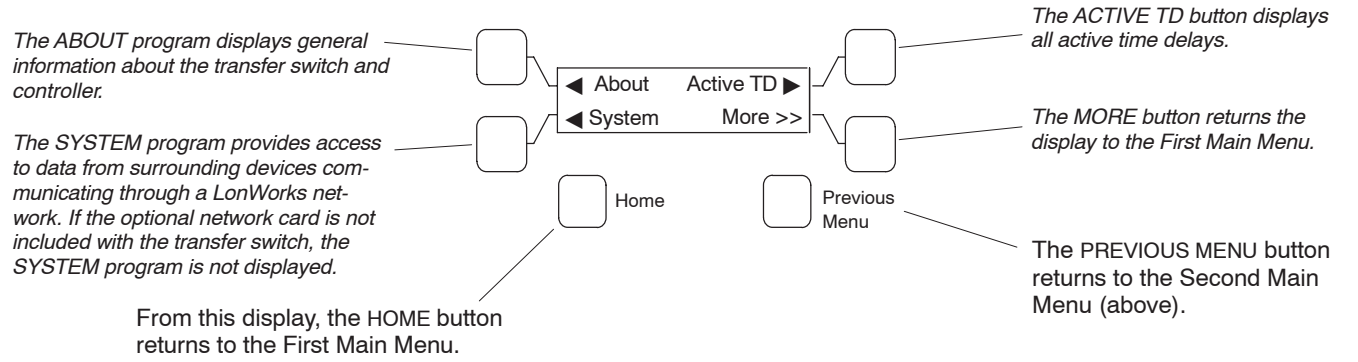
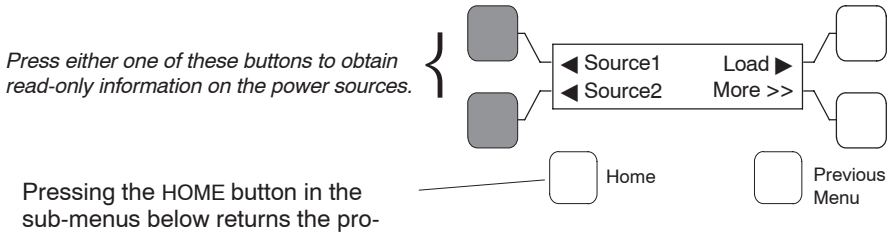
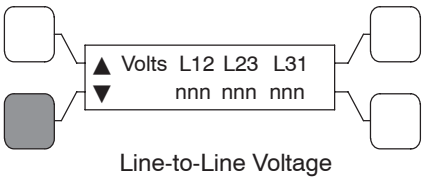


FIGURE 4-2. MAIN MENUS

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



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



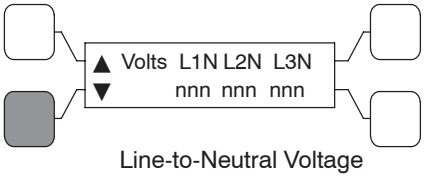
Line-to-Line Voltage

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.

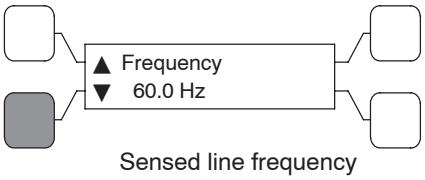
On Level 2 Controllers, if the Source is two phase, the display will read voltages at L12 and L31.



Line-to-Neutral Voltage

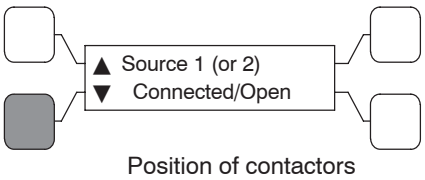
This screen displays Line-to-Neutral voltage measurements for three phase, two phase, or single phase configurations. (Numbers do not display if the system has no neutral.)

This screen does not display with Level 1 controllers.



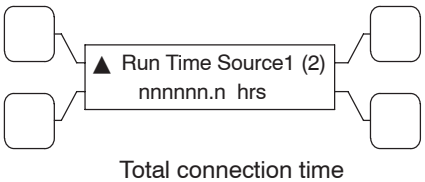
Sensed line frequency

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.



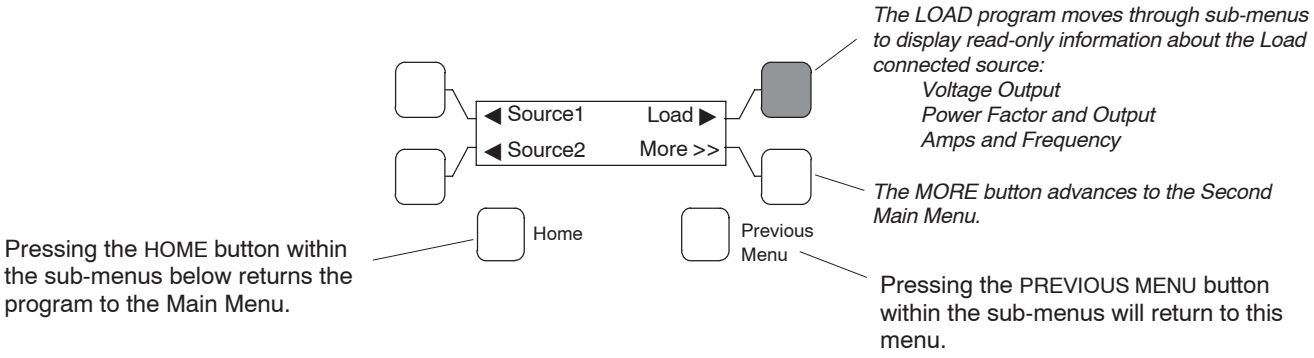
Total connection time

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

FIGURE 4-3. SOURCE 1 AND 2 SUB-MENUS

FIRST MAIN MENU – Load Sub-Menus

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



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

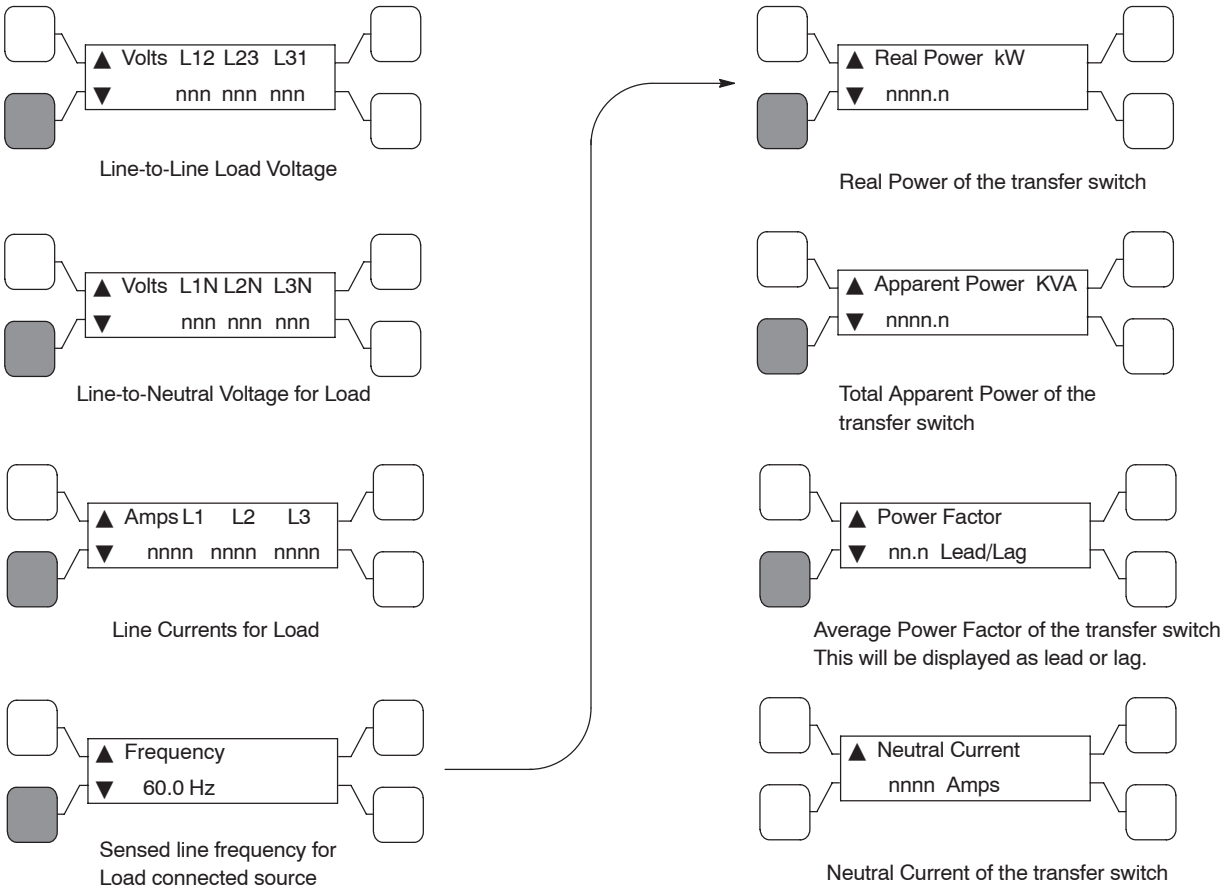
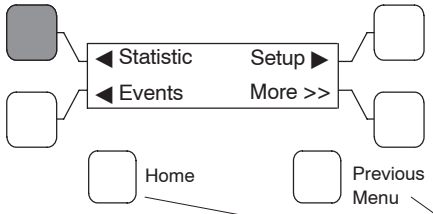


FIGURE 4-4. LOAD SUB-MENUS

SECOND MAIN MENU – Statistics Sub-Menus

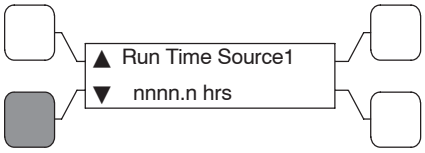
The STATISTICS program displays read-only information about either source:

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

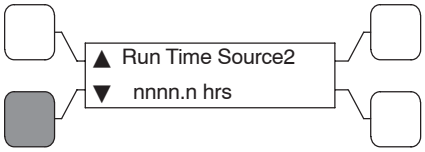


From this display, the PREVIOUS MENU and HOME buttons return the program to the First Main Menu.

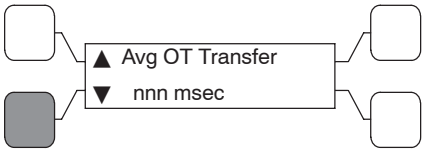
Use the ▲▼ buttons on left to navigate through these screens.



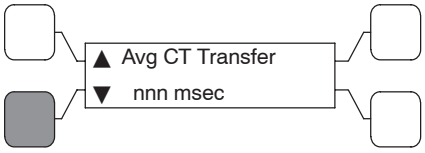
Total time the transfer switch has been connected to Source 1



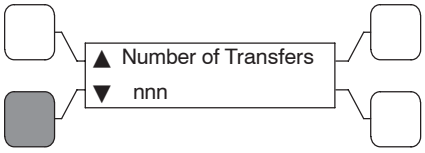
Total time the transfer switch has been connected to Source 2



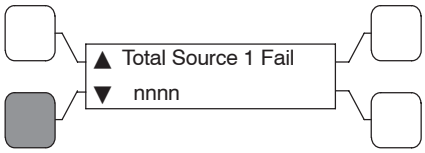
Average time over the last four transfers between the start of the command to move the switch from the old source (OT) and the position sensor sensing that the movement was completed.



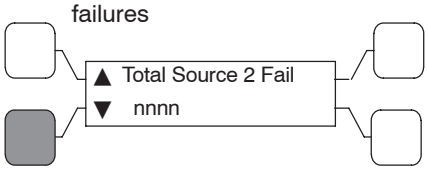
Average time over the last four transfers between the start of the command to close the new switch (CT) and the position sensor sensing that the movement was completed.



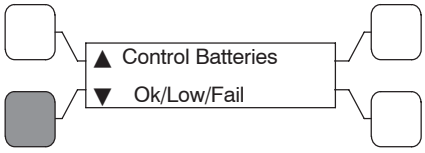
Total number of switch transfers in both directions



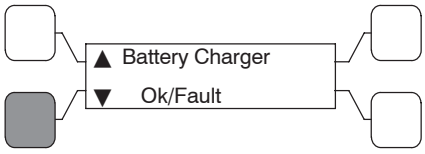
Total number of Source 1 failures



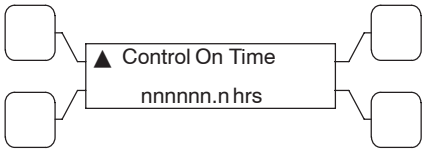
Total number of Source 2 failures (includes under-voltage, over-voltage, over/under frequency)



Status of lithium batteries on controller board



Status of optional generator battery charger



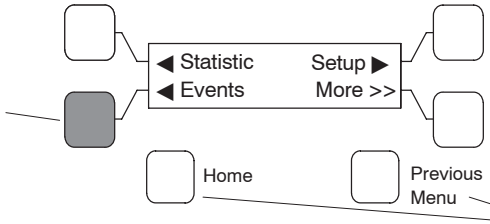
Displays the amount of time the controller board has been operating since initialization. Value is stored permanently.

FIGURE 4-5. STATISTIC 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.

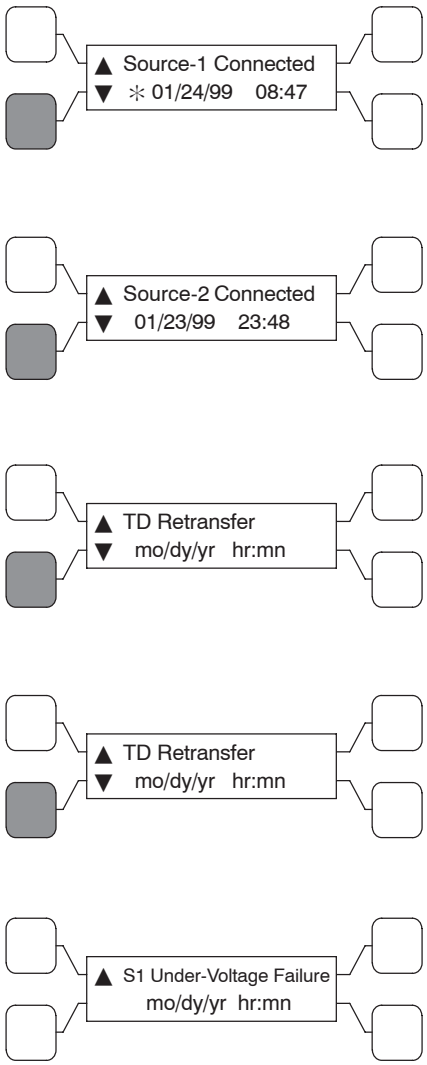
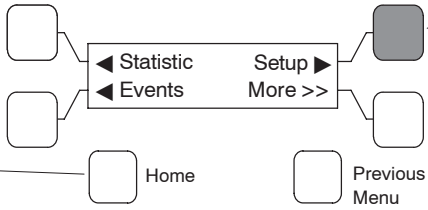


FIGURE 4-6. EVENTS SUB-MENUS

SECOND MAIN MENU – Setup Sub-Menus

Password



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*

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

The MORE button advances to the Third Main Menu.

Entering the Password Program

Press the Setup button to access the setup password menu.

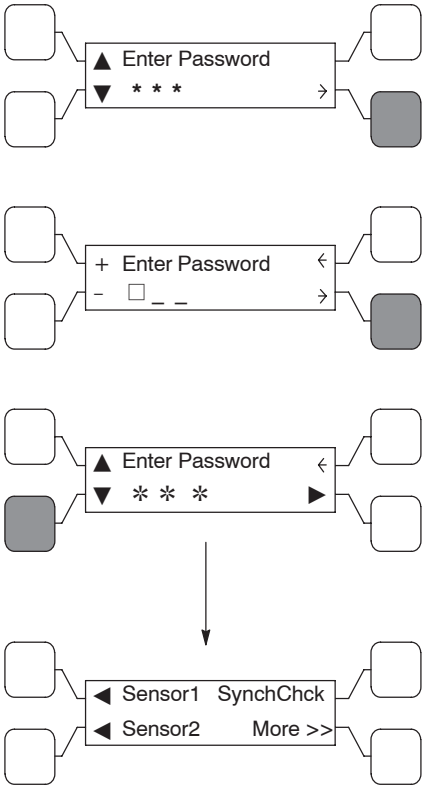
The password is 574.

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.

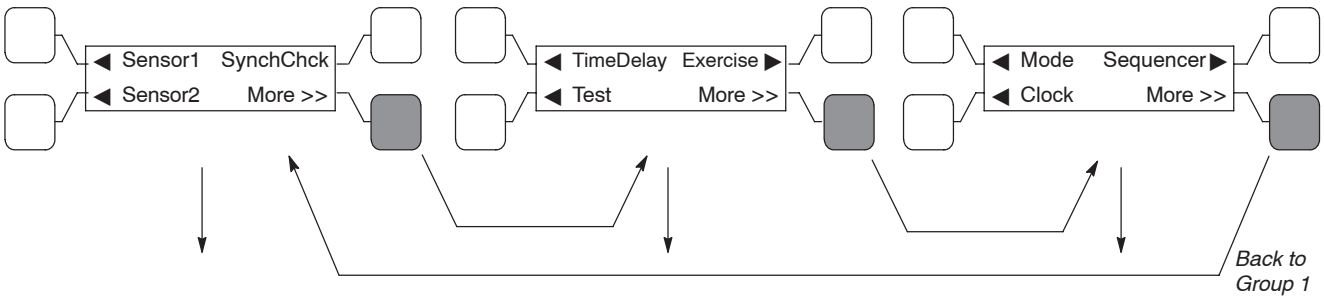
When the password is set, press the ▶ button to enter the setup program.



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

FIGURE 4-7. 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
- Under-voltage Settings
- Over-voltage Settings
- Time Delays
- Frequency Settings
- Imbalance Settings
- Phase Loss
- Phase Rotation

See Figure 4-10 for Sensor sub-menus.

The *SynchChck* sensor sub-menus allow programming synchronous conditions for Source 1 and Source 2 that must be met before transferring from one to the other source. See Figure 4-11 for Sync Check 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 4-12 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 4-13.

Exercise sub-menus (see Figure 4-14) allow programming an exercise routine for Power Source 2 and are available only on utility-to-genset controls. *Exercise* sub-menus (see Figure 4-15) also allow for adding and deleting exercise exceptions.

Only one exercise and one exercise exception can be set up on a Level 1 control using the PC Service tool or the digital display.

If a Level 2 control is installed, a second exercise program and exercise exception can be set up using the digital display. Up to 8 exercises and exercise exceptions can be programmed using the PC Service tool.

Setup Group 3

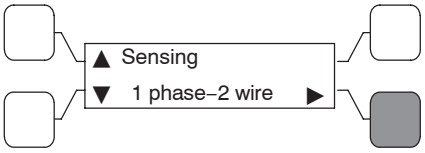
The *Mode* sub-menu allows programming the type of transition the switch uses. See Figure 4-16.

The *Clock* sub-menus program the time and date, as well as daylight savings time. See Figure 4-17.

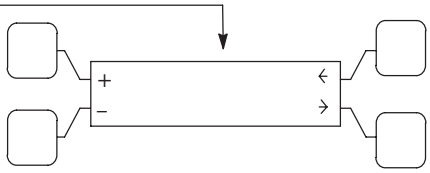
Load *Sequencer* is a software feature, available only with LonWorks Network Communication Module (NCM). This program allows the user to send a predetermined sequence of event announcements in a timed, sequential order to turn the load on and off. See FIgure 4-18.

FIGURE 4-8. 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 CHANGES/CANCEL CHANGES 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 CHANGES/CANCEL CHANGES screen is invoked.

Saving or Canceling Setup Parameters

Changing any data within the setup sub-menus invoke this screen when exiting the Setup sub-menu groups.

Use the "Cancel changes" button to delete any setup parameter changes that were made during the current session. The program will revert to it's original data.

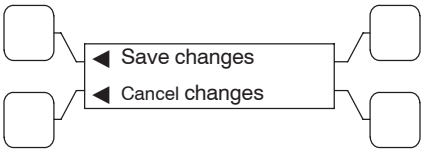


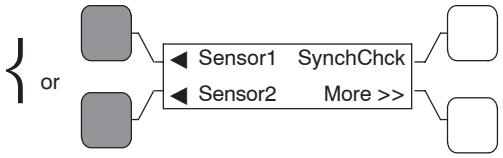
FIGURE 4-9. CHANGING SETUP PARAMETERS

Setup – *Group 1*

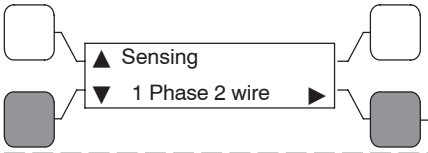
Sensor 1 & Sensor 2 Sub-Menus

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

S1 refers to Source 1
S2 refers to Source 2



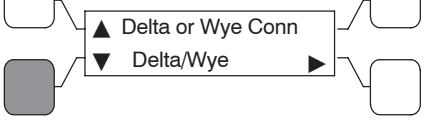
For 2-wire system, select: 1 phase 2 wire.
For a single phase - 3 wire system, select: 1 phase 3 wire.
For a 3 phase system, select: 3 phase.
See Note 2.



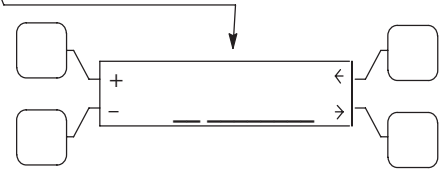
Level 2 Controllers Only

Delta or Wye Configuration. This menu is only displayed with Level 2 Controllers.

Chose Delta or Wye (Wye).



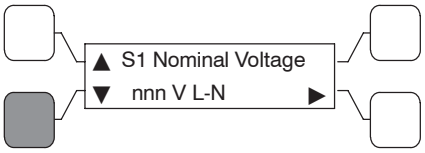
When this button is pressed in any sub-menu, a cursor appears in the location of the editable field. In most cases, there is only one field to edit.



System Voltage for Source 1 or 2

Enter the system voltage between 110 and 600 VAC.

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



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

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.

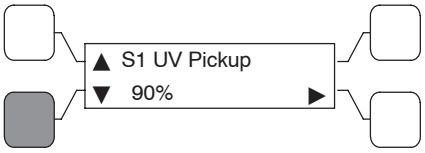
Changing any data within the setup sub-menus will invoke a SAVE CHANGES/CANCEL CHANGES screen when exiting the Setup Sub-menu Groups.

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 CHANGES/CANCEL CHANGES screen is invoked.

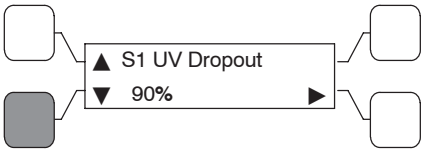
Under-Voltage Sensor Pick-Up

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



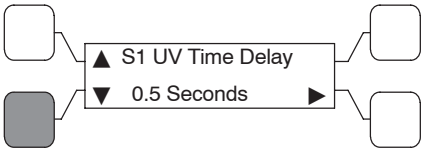
Under-Voltage Sensor Drop-Out Voltage

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



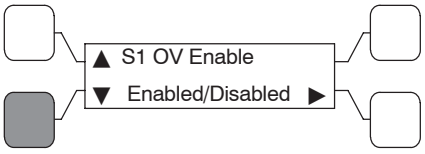
Under-Voltage Drop-Out Time Delay

Enter an time between 0.0 and 4.0 seconds (0.5 seconds).



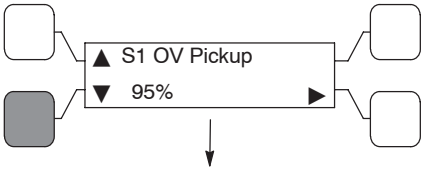
Over-Voltage Sensing Enable

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%).



Continued on next page

Note 1: Default values are in parenthesis.

Note 2: Not all sensing choices are valid for for all combinations of Level 1/Level 2 and Source 1/Source 2 transfer switches. Only the valid choices are displayed.

FIGURE 4-10. SETUP GROUP 1 – SENSOR SUB-MENUS

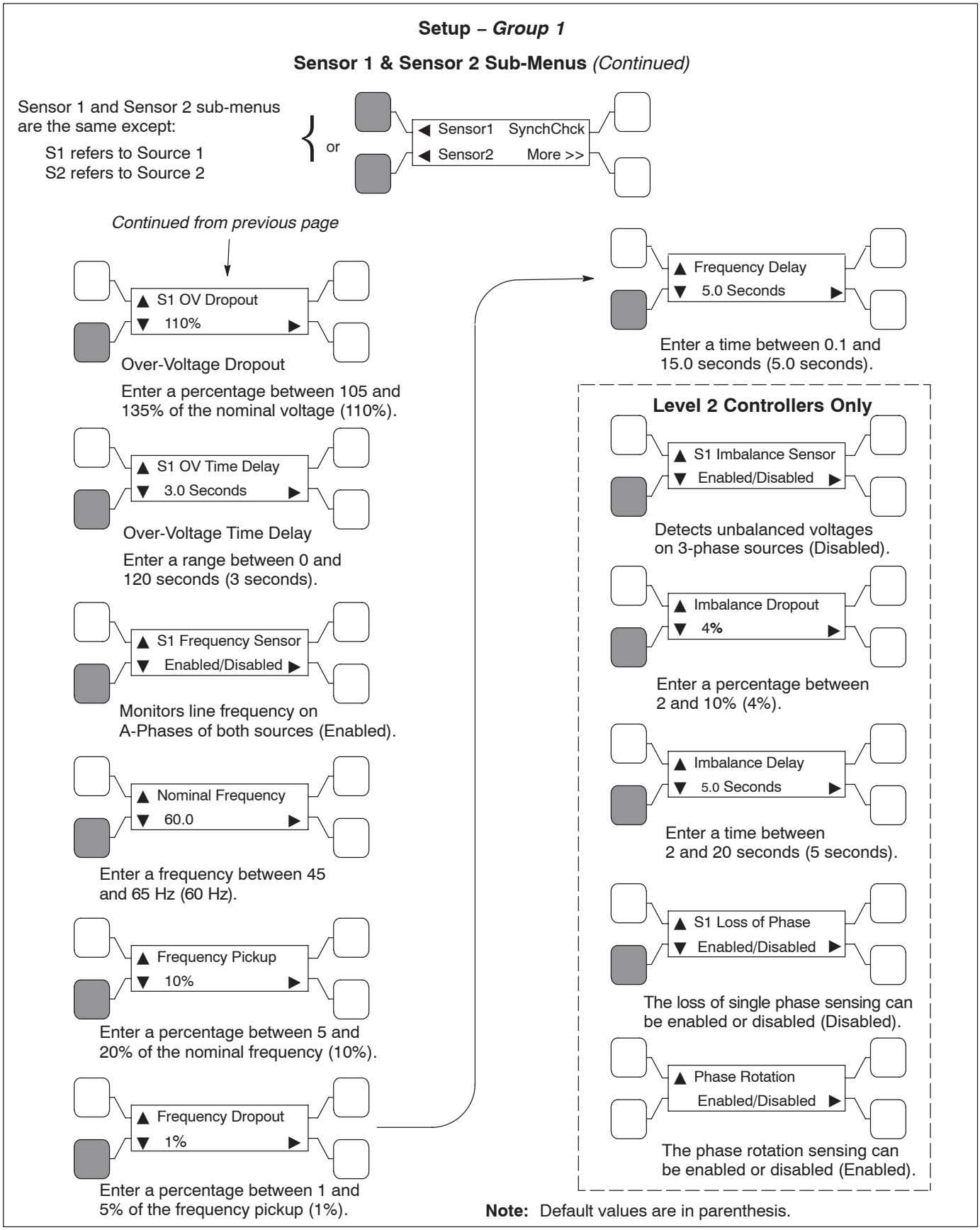
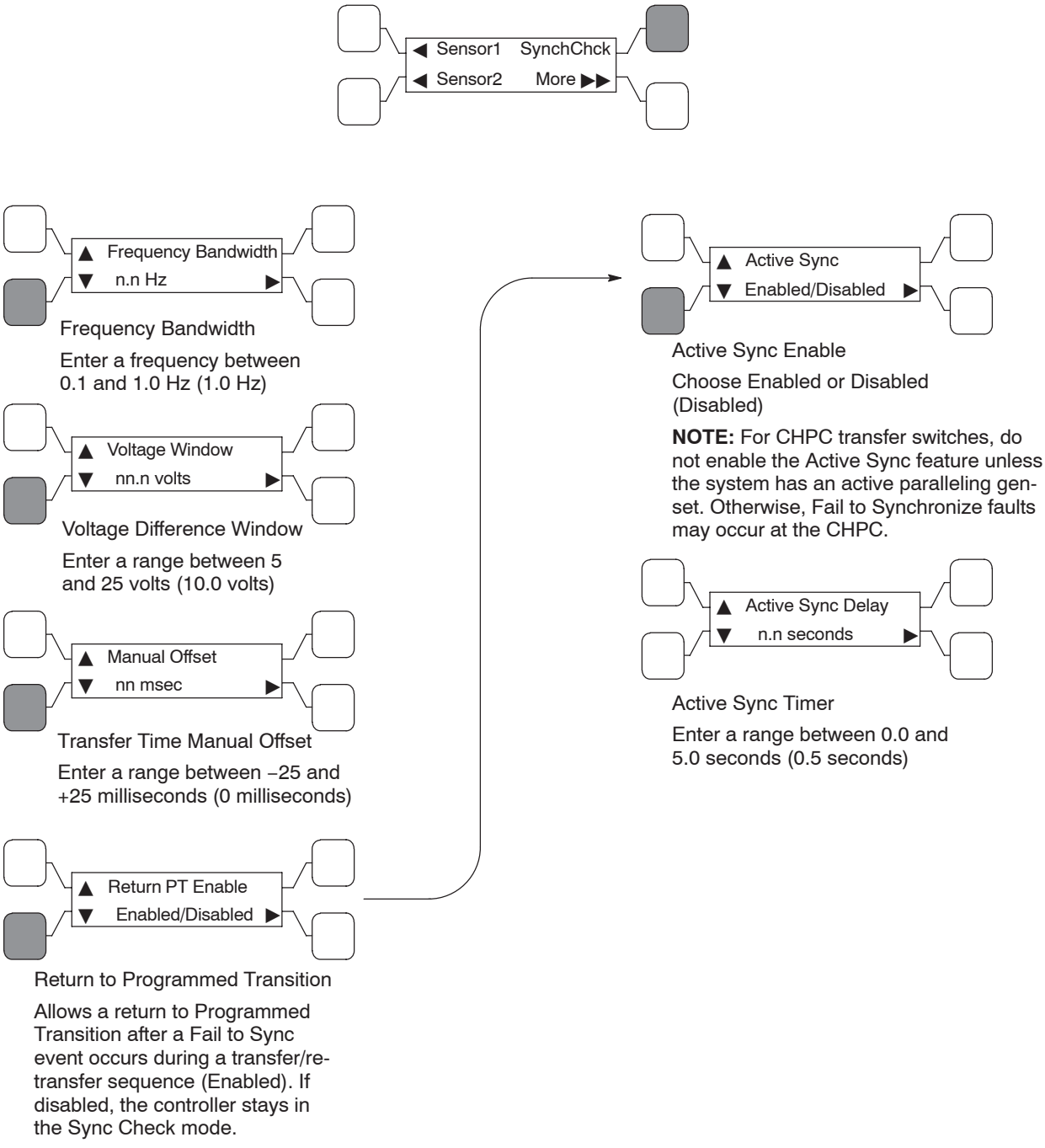


FIGURE 4-10. SETUP GROUP 1 – SENSOR SUB-MENUS (Continued)

Setup – *Group 1*

Sync Check Sub-Menus

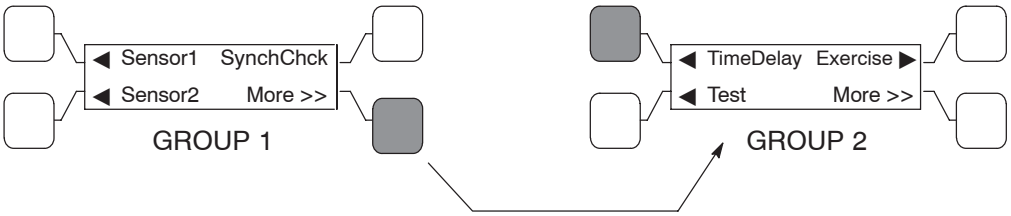


Note: Default values are in parenthesis.

FIGURE 4-11. SYNC CHECK SUB-MENUS

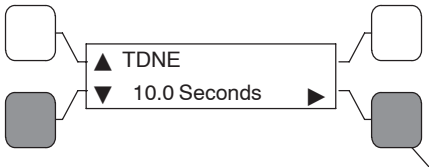
Setup – *Group 2*

Time Delay Sub-Menus



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

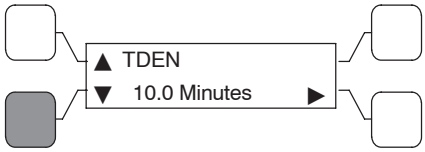
Enter a time from 0 to 120 seconds (10 seconds). See Note 2.

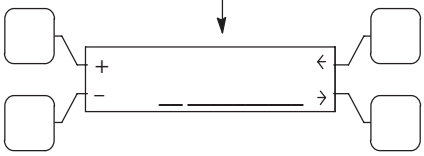


When this button is pressed in any sub-menu, a cursor appears in the location of the editable field. In most cases, there is only one field to edit.

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

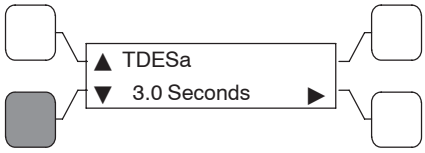
Enter a time from 0 to 30 minutes (10 minutes).





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 15 (Level 1 controls or 0 to 120 (Level 2 controls) seconds (3.0 seconds). See Notes 2 and 3.



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.

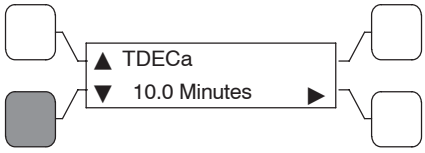
Changing any data within the setup sub-menus will invoke a SAVE CHANGES/CANCEL CHANGES screen when exiting the Setup Sub-menu Groups.

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 CHANGES/CANCEL CHANGES screen is invoked.

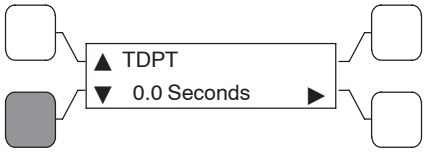
Sets the time delay for Engine Cool-down following a re-transfer. This menu does not appear in utility-to-utility installations.

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



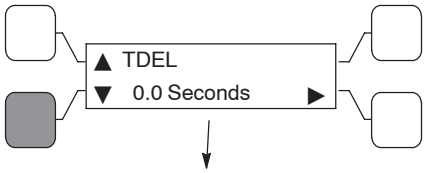
Sets the time delay for Programmed Transition setting of 0.0 disables the program.

Enter a time from 0 to 60 seconds (0 seconds). See Note 2.



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

Enter a time from 0 to 60 seconds (0 seconds). See Note 2.



Continued on next page

Note 1: Default values are in parenthesis.

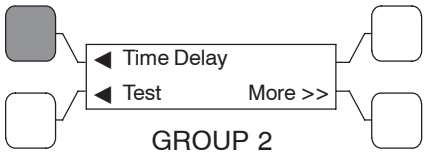
Note 2: TDNE, TDESa, TDESb, TDEL, and TDPT values up to 20 seconds are adjustable in 1 second increments. Values over 20 seconds are adjustable in 5 second increments.

Note 3: For long engine start time delays (over 15 seconds) a remote battery source should be used.

FIGURE 4-12. SETUP GROUP 2 – TIME DELAY SUB-MENUS

Setup – *Group 2*

Time Delay Sub-Menus *(Continued)*



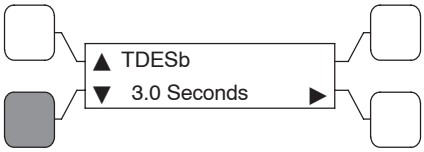
This group is used only in Genset-to-Genset applications.

Continued from previous page

Level 2 Controller Only

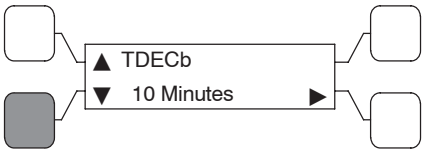
Sets the Engine Start time delay for genset (b).

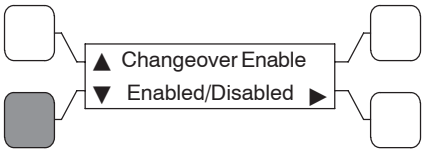
Enter a time from 0 to 15 (Level 1 controls) or 0 to 120 (Level 2 controls) seconds (3.0 seconds). See Notes 2 and 3.



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 0 to 336 hours (24 hours).

Note 1: Default values are in parenthesis.

Note 2: TDNE, TDESa, TDESb, TDEL, and TDPT values up to 20 seconds are adjustable in 1 second increments. Values over 20 seconds are adjustable in 5 second increments.

Note 3: For long engine start time delays (over 15 seconds) a remote battery source should be used.

FIGURE 4-12. SETUP GROUP 2 – TIME DELAY SUB-MENUS (Continued)

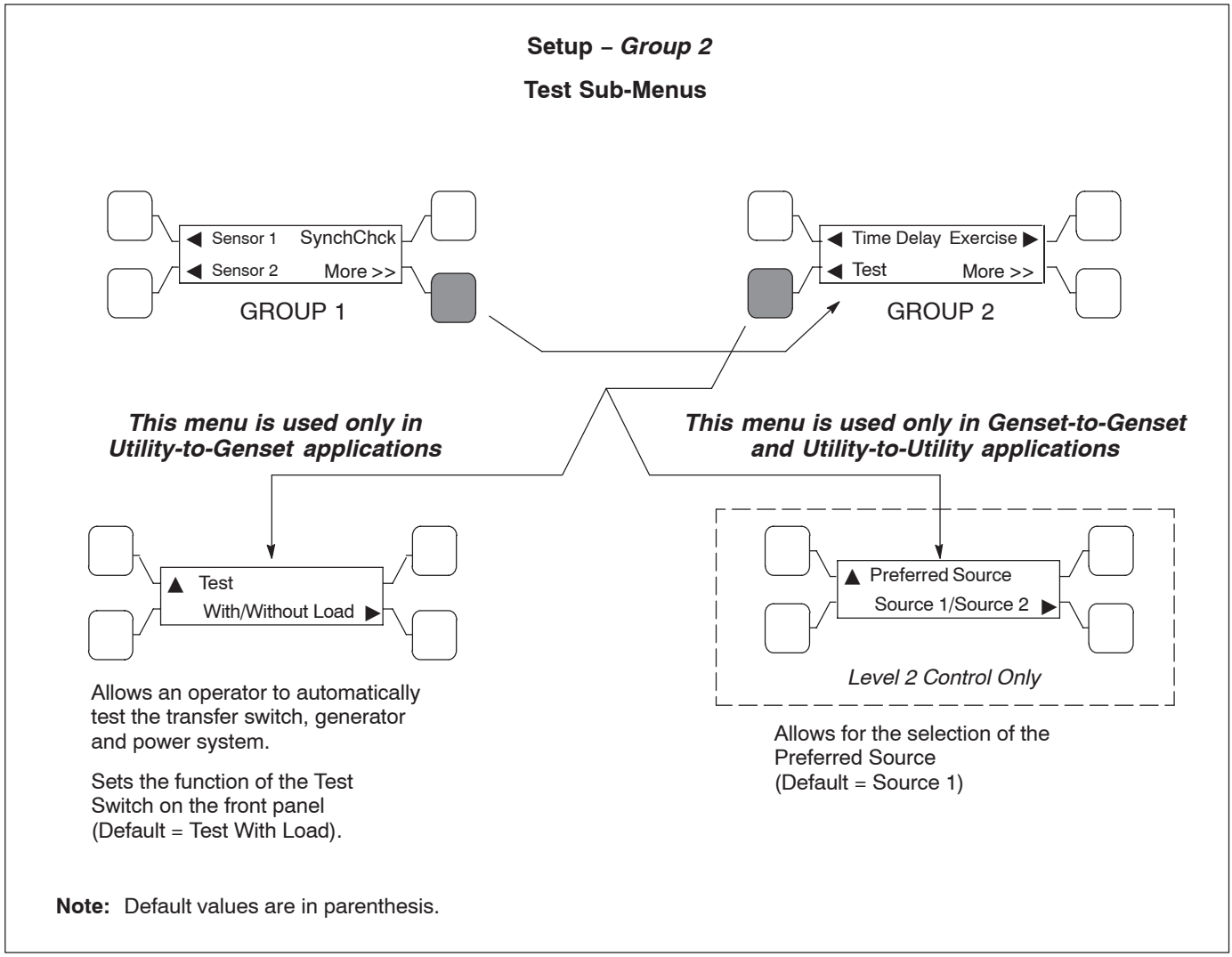
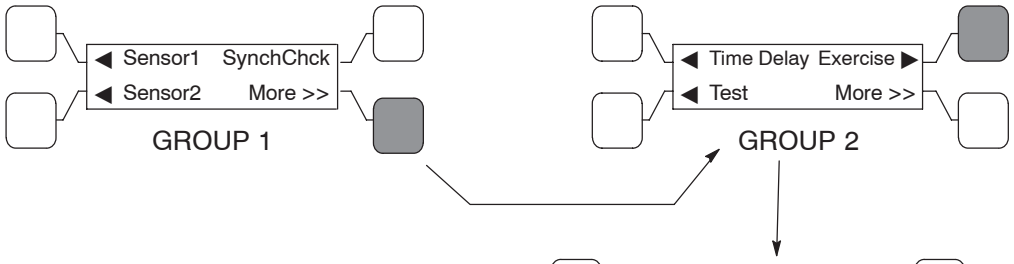


FIGURE 4-13. SETUP GROUP 2 – TEST SUB-MENUS

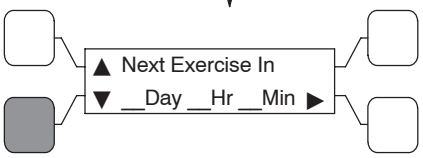
Setup – *Group 2*

Exercise Sub-Menus

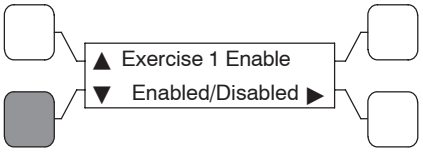
These sub-menus are only available in Utility-to-Genset applications.



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

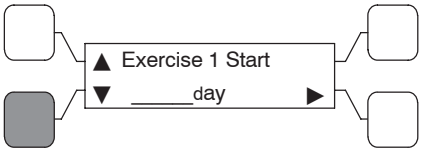


This screen allows disabling Exercise 1 only. (Default = Disabled)



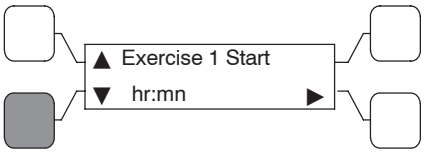
The first of four programming sub-menus for the Exercise cycle. Sets the day an Exercise cycle will occur

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



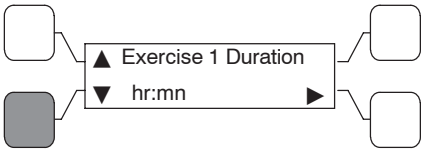
Sets a Time for the exercise cycle to begin.

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.

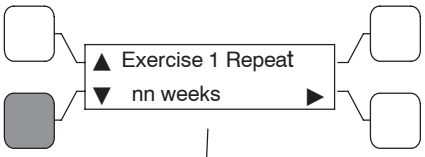
Enter a time within a 24 hour period: hr = 0–23, mn = 0–59. (Default = 00:00)



Sets an interval the exercise cycle will repeat.

Enter a cycle between 0 and 52 weeks. (Default = 0 weeks). Typical values are 1 or 2.

Set the value to 0 to exercise one time only.
Set the value to 1 to exercise once a week.
Set the value to 2 to exercise every other week.



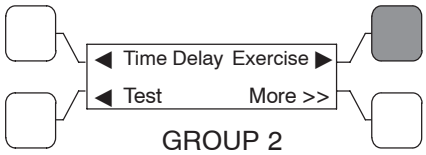
Continued on next page

Note: Only one exercise is available for Level 1 Controllers

FIGURE 4-14. SETUP GROUP 2 – EXERCISE SUB-MENUS

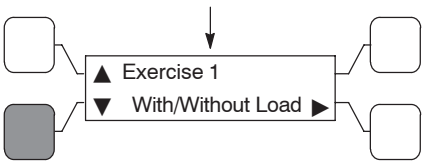
Setup – *Group 2*

Exercise Sub-Menus *(Continued)*



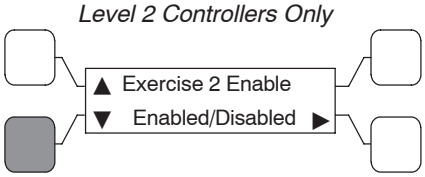
Level 2 Controllers allow for two exercise programs to be setup from the Setup menu screen. Six additional programs and eight exceptions can be setup using the PC Service tool.

Continued from previous page

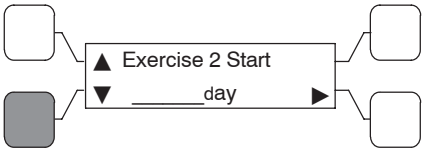


Enables or disables the first exercise program to run the generator(s) with or without a load. (Default = Without Load)

Level 2 Controllers Only

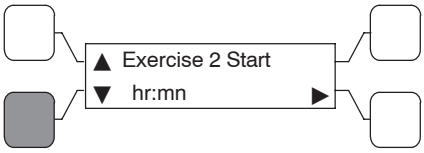


This screen allows disabling Exercise 2 only. (Default = Disabled)



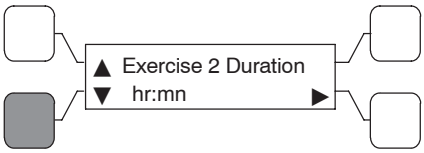
Sets the day of the second exercise cycle.

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



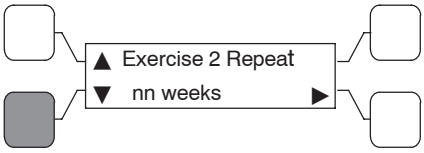
Sets the time the second exercise cycle will begin.

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



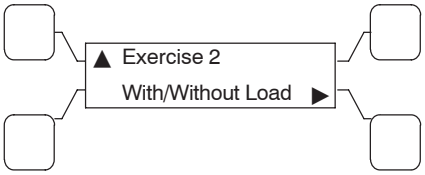
Sets a time limit the second exercise cycle will run.

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

Set the value to 0 to exercise one time only.
Set the value to 1 to exercise once a week.
Set the value to 2 to exercise every other week.



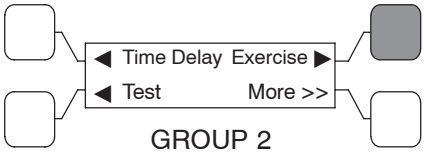
Enables or disables the second exercise program to run the generator(s) with or without a load. (Default = Without Load)

Add and Delete Exceptions
(continued on next page)

FIGURE 4-14. SETUP GROUP 2 – EXERCISE SUB-MENUS (Continued)

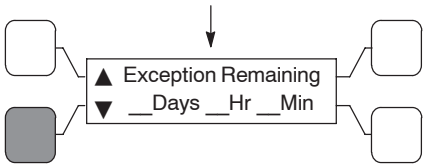
Setup – *Group 2*

Exercise Exceptions Sub-Menus

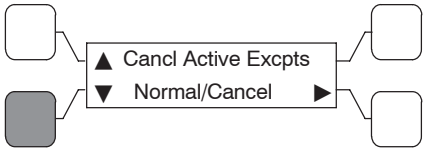


Level 1 Controllers allow for setting one exception. Level 2 Controllers allow for adding and deleting exceptions to the two exercise programs setup from the Setup menu screen.

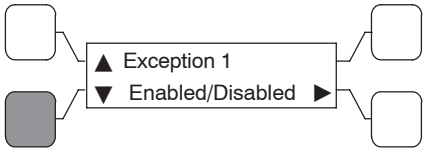
Continued from previous page



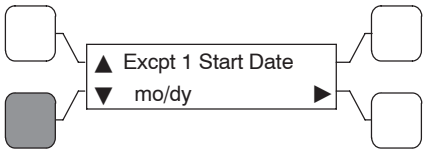
Indicates the time remaining for the exception of the longest duration. If there are no active exceptions, the message "No Excepts Active" is displayed on the first line.



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

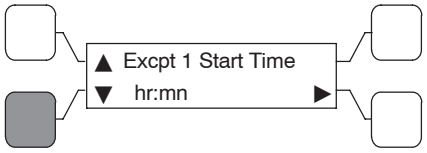


This screen allows enabling/disabling Exception 1 only. (Default = Disabled)



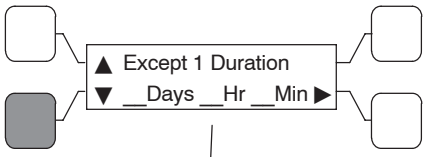
Sets the month and day for Exception 1.

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.

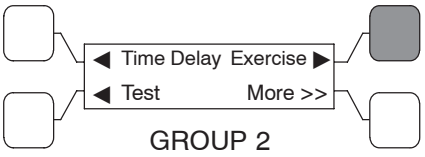
Enter a time: days = 1–31, hr = 0–23, mn = 0–59.

Continued on next page

FIGURE 4-15. SETUP GROUP 2 – EXERCISE EXCEPTIONS SUB-MENUS

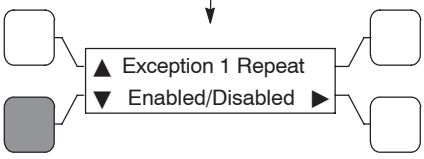
Setup – *Group 2*

Exercise Exceptions Sub-Menus *(Continued)*



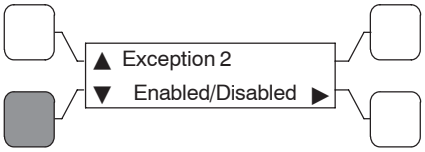
Continued from previous page

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



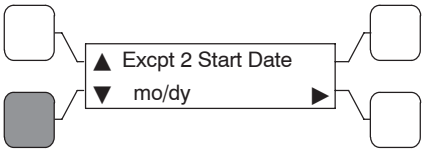
Level 2 Controllers Only

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



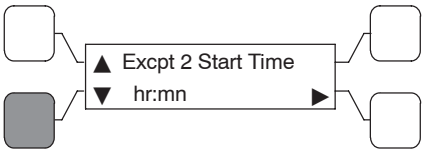
Sets the month and day for Exception 2.

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



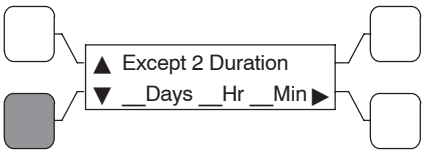
Sets a time of day for Exception 2.

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: days = 1–31, hr = 0–23, mn = 0–59.



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

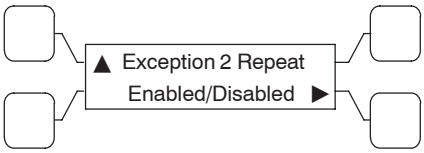


FIGURE 4-15. SETUP GROUP 2 – EXERCISE EXCEPTIONS SUB-MENUS (Continued)

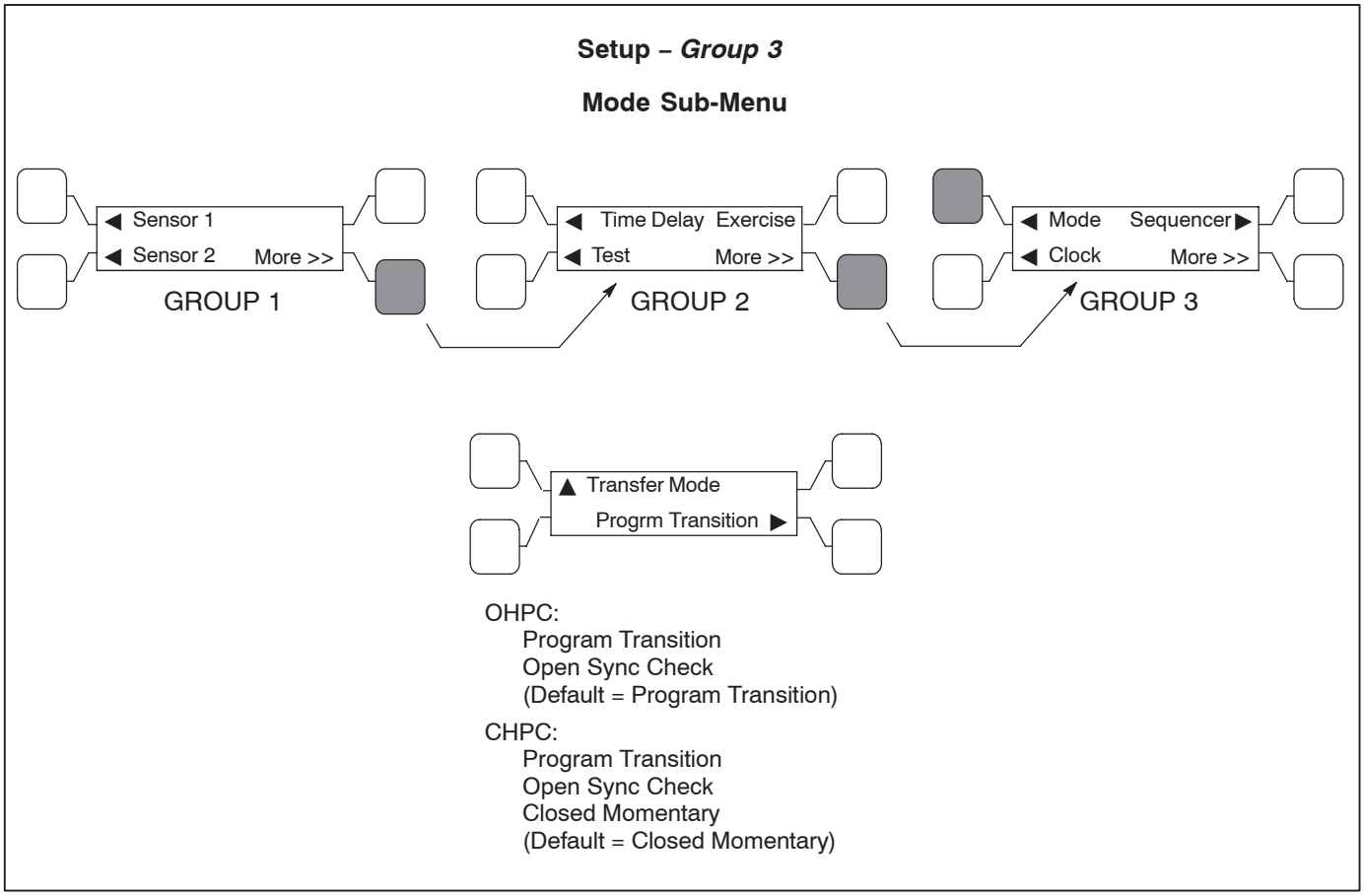
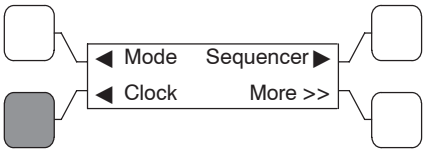


FIGURE 4-16. SETUP GROUP 3 – MODE SUB-MENUS

Setup – *Group 3*

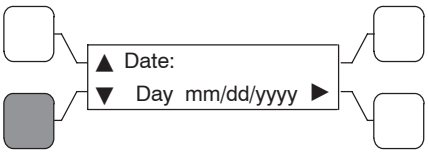
Clock Sub-Menus



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

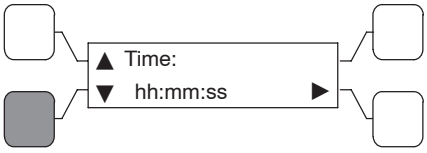
Sets the actual day and date.

Enter a month between Jan = 1 and Dec = 12, date between 1 and 31, and year between 2000 and 2099.

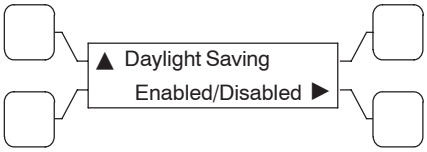


Sets the actual time of day.

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)



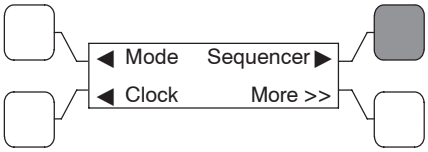
Note: The Daylight Savings Time program is set for North America.
- The first Sunday in April – moves the time forward one hour.
- The last Sunday in October – moves the time back one hour.

If you are anywhere outside of North America, the time should be changed manually.

FIGURE 4-17. SETUP GROUP 3 – CLOCK SUB-MENUS

Setup – *Group 3*

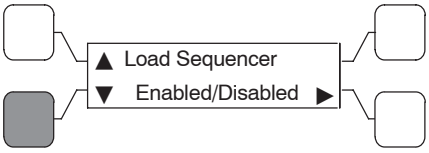
Sequencer Sub-Menus



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. When used, a few seconds should be allowed between load steps to allow the generator voltage and frequency to stabilize.

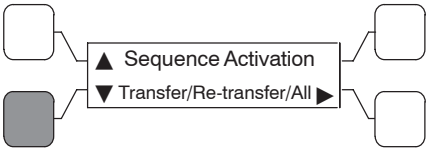
Sequencer is available only with the Network Communication Module. The module must be installed and enabled before these screens are displayed.

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



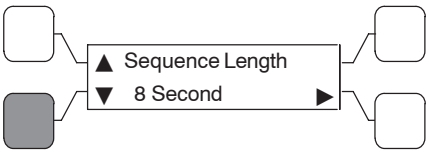
Sets activation for certain operational modes.

Choose Transfer, Re-transfer, or All



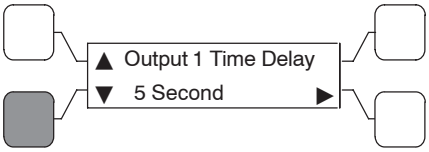
The control can activate a maximum of 8 relay output signals.

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



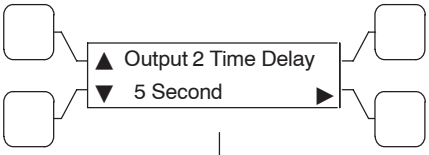
When Load Sequencer is triggered, the controller deactivates all remote relay output signals. Starting with Relay 1, the controller counts down the specified time delay, then activates Relay 1.

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 4-18. SETUP GROUP 3 – SEQUENCER SUB-MENUS

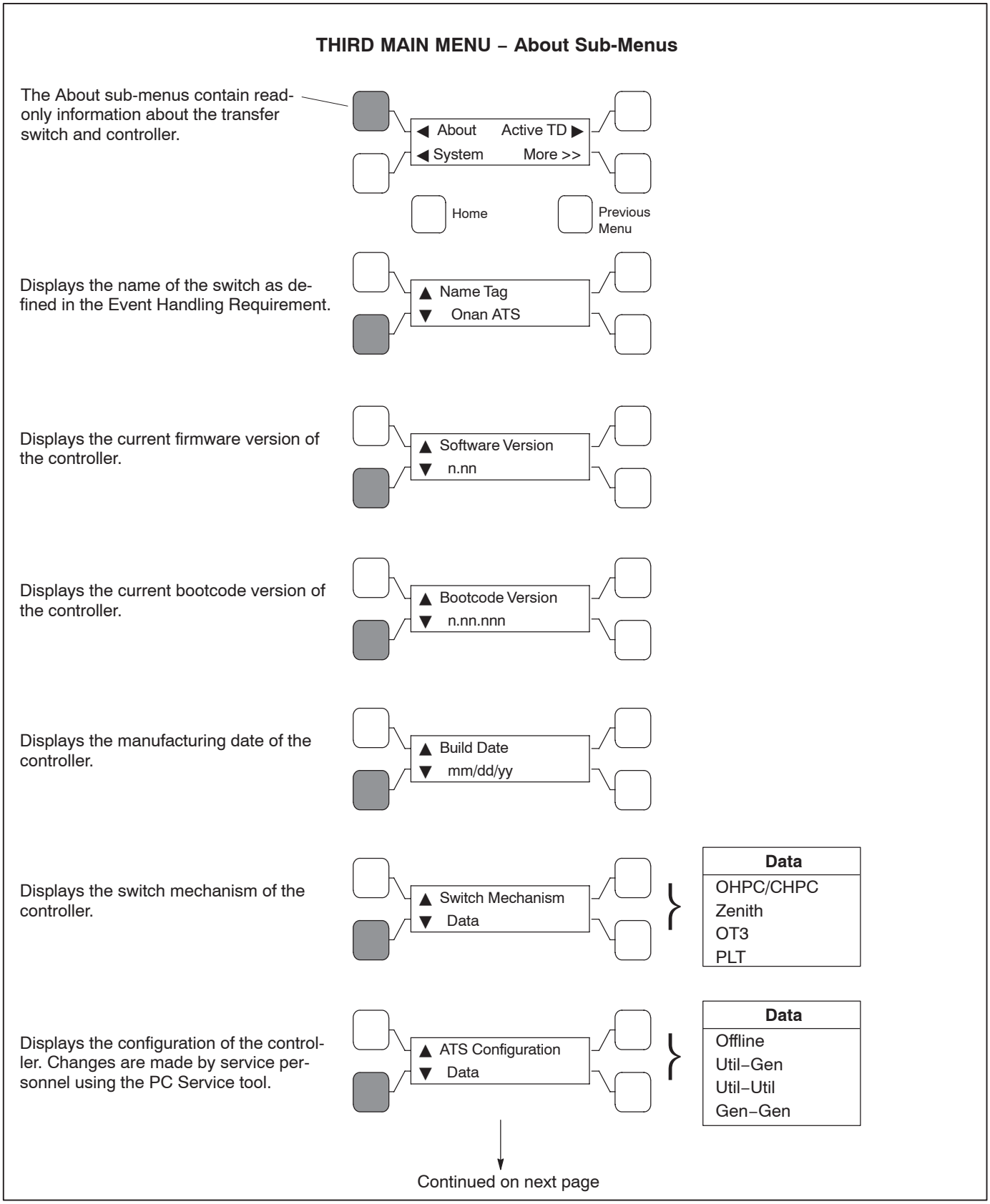
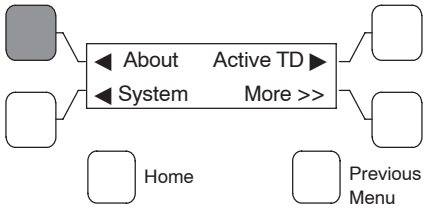
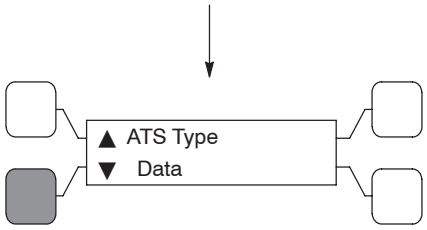


FIGURE 4-19. THIRD MAIN MENU – ABOUT SUB-MENUS

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

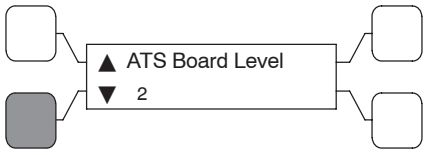


Continued from previous page

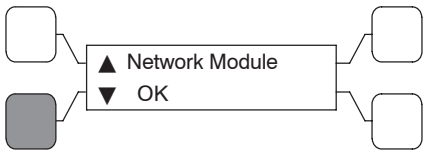


Displays the mode of operation the control is using. Adjustments can be made by service personnel using the PC Service tool.

Data
OT = Open Transition
BT = Bypass Transition
CT = Closed Transition

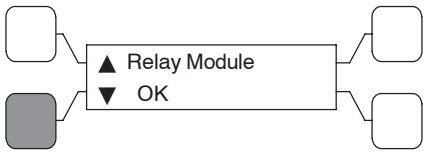


Displays the ATS board level (1 or 2).

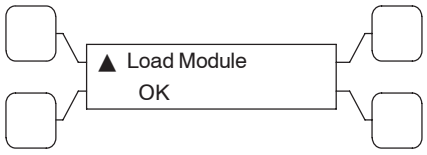


This screen indicates if a Network Communications Module is installed and enabled.

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.

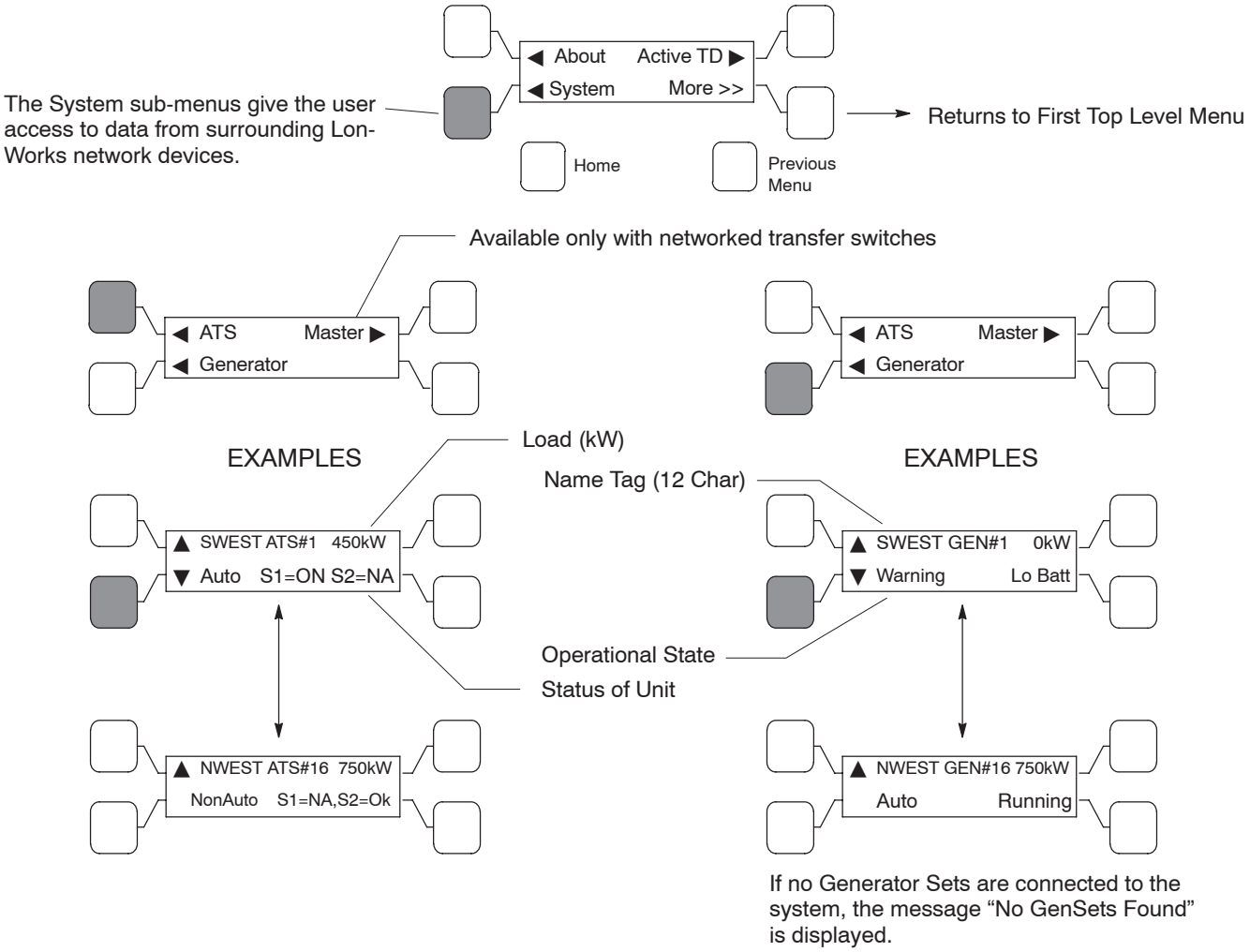
Data
OK
Not Installed

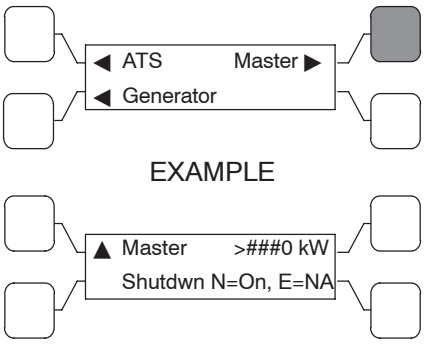
FIGURE 4-19. THIRD MAIN MENU – ABOUT SUB-MENUS (Continued)

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.





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 4-20. THIRD MAIN MENU – SYSTEM SUB-MENUS

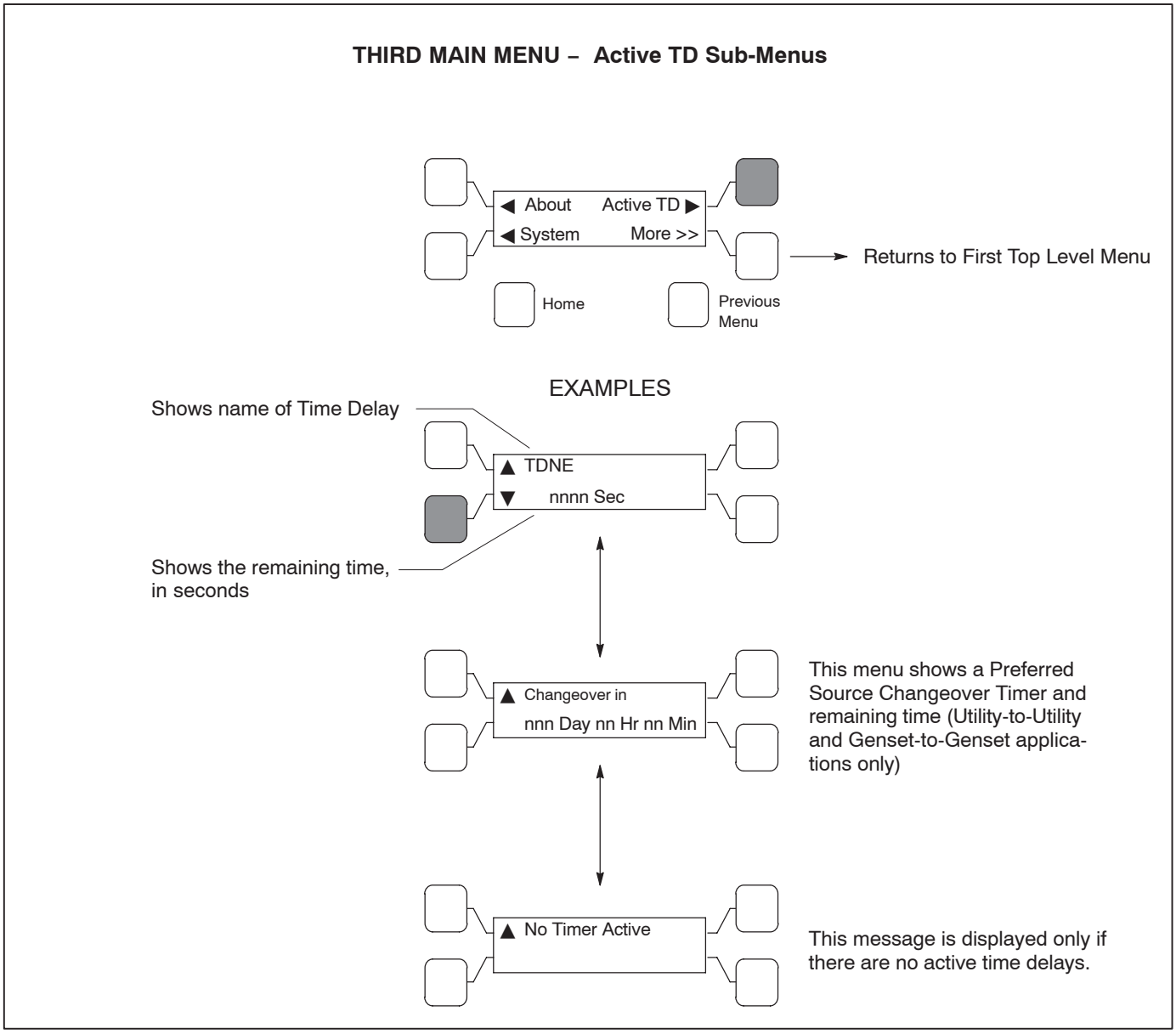
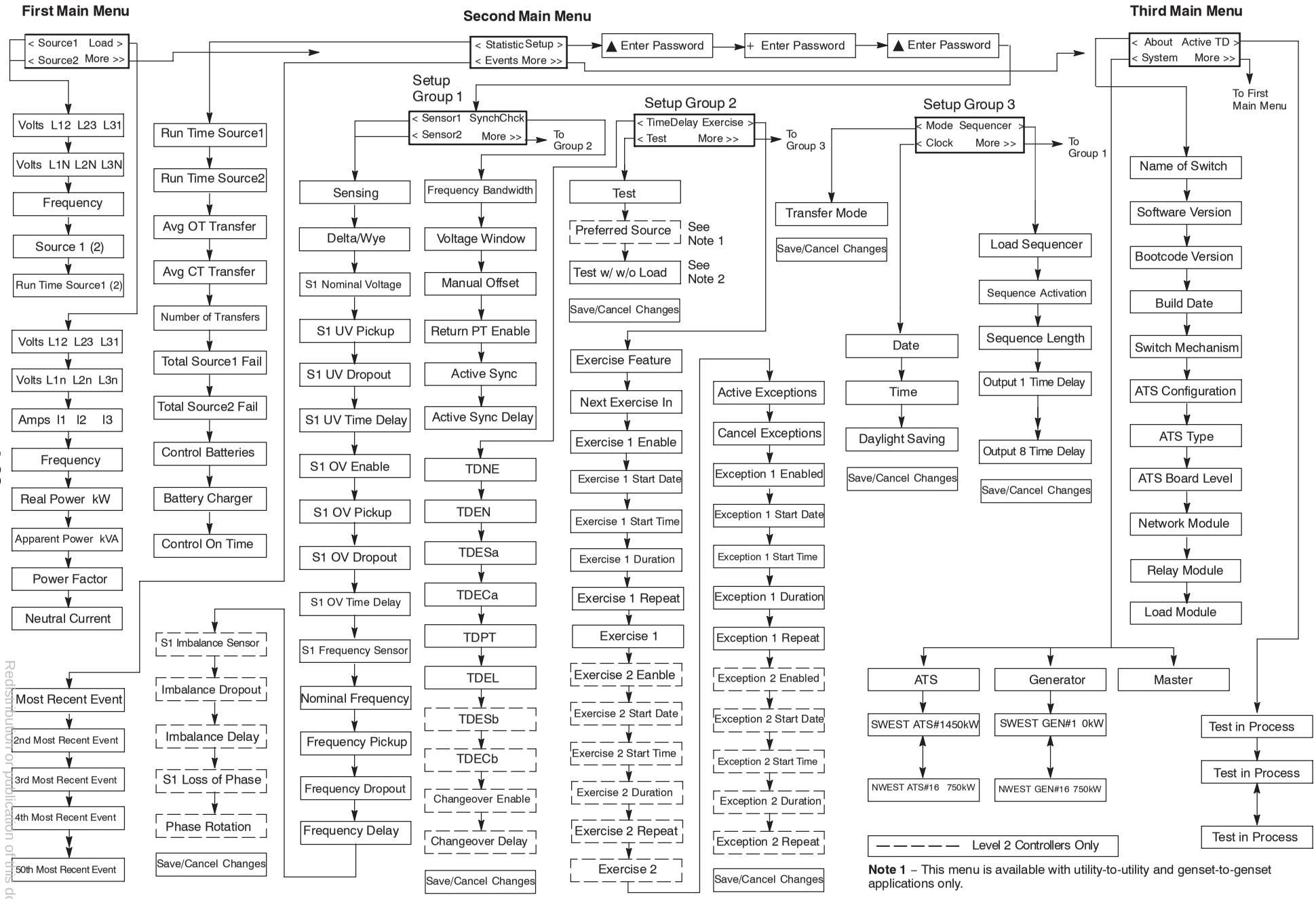


FIGURE 4-21. THIRD MAIN MENU – ACTIVE TD SUB-MENUS



Note 1 – This menu is available with utility-to-utility and genset-to-genset applications only.

Note 2 – This menu is available with utility-to-genset applications only.

FIGURE 4-22. MENU SYSTEM MAP

5. Events

This section describes the OHPC/CHPC events. Events can be viewed with the PC Service tool and on transfer switches that are equipped with the digital display.

INTRODUCTION

The controller displays the last event that occurred on the digital display. Up to 50 events can be viewed in the event history file.

Active events consist of a text message, a date/time stamp, and an asterisk. The asterisk indicator is part of an active event message until the event becomes inactive. Some events require pressing the Reset/Lamp Test button on the control panel to make the event inactive.

Event History

The controller records up to 50 events in the event history file. When the history file is full and a new event occurs, the control adds it to the history file and deletes the oldest event in the history file. The PC Service tool and the digital display can be used to view the events. See the Digital Display Menu System section for how to view previous events.

NOTE: The controller automatically saves a record of events twice a day. If power is lost for more than 20 seconds, the controller attempts to save a record of current events. If the controller batteries and power are removed, data not saved is lost.

EVENTS

The following is an alphabetical listing of OHPC/CHPC transfer switch events.

Charger Error

For transfer switches that include a genset battery charger, this event signals the controller that the genset battery charger is malfunctioning and may need to be replaced.

This is not a standard factory connection. For more information, contact your dealer or distributor.

The event remains active until the Reset button on the front panel is pressed.

Common Alarm

This network event is active whenever any of the following events are active.

- Control Battery Low
- Control Locked Out
- Charger Error
- Fail to Transfer
- Fail to Retransfer
- Fail to Charge Sprg
- Fail to Disconnect
- Network Battery Low
- Network Error
- S1 Failed to Open
- S1 Failed to Close
- S2 Failed to Open
- S2 Failed to Close

For this event to become inactive, all of the above events must become inactive and the Reset button on the front panel must be pressed. This event momentarily becomes inactive when the Rest button is pressed but will again become active if any of the above events persist after the reset.

Common Alarm A

When this event is active, Generator A (Source 1) is not available. This input is usually only used in genset-to-genset applications.

Common Alarm B

When this event is active, Generator B (Source 2) is not available. This input is usually only used in genset-to-genset applications.

Control Battery Low

This event is active when the actual voltage of the lithium batteries drops to 5 VDC.

The controller monitors the voltage of the lithium batteries that backup power to the controller. If the battery voltage drops to 5 VDC, the controller sets the fault status to active.

The controller Fault Flash-out subsystem flashes this fault until the Reset button on the front panel is pressed. If the battery voltage is still low, the event stays active.

Control Locked Out

This event is active when there is a failure to open or close the switch mechanism. Because the control is no longer controlling switch movement, the front panel Reset/Lamp Test pushbutton must be pressed to clear the “locked out” state of the control.

Controller Pwr Off

If this event is displayed on the front panel, the controller will shut itself down within 5 seconds of the message being displayed.

If this event is listed in the Event History log, it indicates that the control went to sleep after not receiving AC power from either source for 30 seconds.

The controller signals the Network Communications Module (NCM) and other devices that the ATS controller is going to shutdown due to a lack of power. This signal triggers a time-delay start or other sequences. After the sequences are complete, the controller shuts itself down in order to conserve the back-up batteries. The NCM responds by not communicating to the controller.

CT Enabled

This event is active whenever a closed transition transfer or retransfer is pending.

Delay Spring Charge

The Delay Spring Charge message is displayed to indicate that the software is waiting until the winding process has been completed. The OHPC/CHPC transfer switch mechanism includes a spring assembly that is used to open the switch. Whenever the spring is discharged, it takes approximately five seconds for the motor to automatically rewind the spring.

If the spring is not wound after a fixed period of time, the event “Fail to Charge Sprg” is displayed.

Emergency Start A

This event is active whenever the controller requires the Source 2 genset to start and reach rated speed—otherwise known as an emergency start. There is also a discrete output called Emergency Start A.

Emergency Start B

This event is active whenever the controller requires the Source 1 genset to start and reach rated speed. This event is only used in genset-to-genset control modes. There is also a discrete output called Emergency Start B.

Exercise Active

This event is active whenever an exercise sequence is active. There is an associated LED output on the front panel and a relay output on the Relay Module. When this event is active, the Test/Exercise Active LED on the front panel is lit and the Test/Exercise relay on the relay module is activated.

Fail to Charge Sprg

This event is active if the actuator main springs have failed to wind within a fixed period of time after reconnecting to the new power source. This event causes the control to be locked out and the Reset button on the front panel needs to be pressed to continue operation.

The controller monitors the actuator main spring once the transfer switch initially connects to Source 1 or Source 2. If the spring does not charge within a fixed period of time after reconnecting to the new source, the controller issues a Fail to Charge Spring event. The event stays active until the actuator main spring is again charged. Even if you press the Reset button, the event stays active if the spring isn’t charged.

Fail to Disconnect

This event is active when both sources have paralleled, there is a failure to open either power source, and all attempts to automatically separate them within a set period of time have failed. This event applies to only closed transition modes and is needed to trip an external circuit breaker.

The event remains active until the Reset button on the front panel is pressed.

Fail to Sync

This event indicates the two power sources have failed to synchronize either voltage, phase, or frequency within the time limit of 120 seconds.

The event stays active until the Reset/Lamp Test button on the front panel is pressed. The Fail to Sync relay output stays closed until the Reset button is pressed.

After a Fail to Sync event occurs, another Fail to Sync event may occur or, if set up to do so, the transfer switch may go to open transition. If not set up to go to open transition, a series of Fail to Sync events may repeat until the system synchronizer is adjusted or repaired.

Fail to Retransfer

For utility-to-genset applications, this event is active if the transfer switch failed to move from Source 2 to Neutral or Neutral to Source 1 within a preset time limit.

For utility-to-utility and genset-to-genset applications, this event is active if the transfer switch failed to move from the backup source to the preferred source within a preset time limit.

For open transition transfer switches, the controller first verifies that the transfer switch moved from Source 1 to Neutral within the time limit defined in the Fail to Open Time Delay. The controller also verifies that the transfer switch moved from Neutral to Source 2 within the time limit defined in the Fail to Close Time Delay.

For closed transition transfer switches, the controller verifies that the ATS transferred from Source 1 to Source 2 within the time limits.

If the time limits are exceeded, the controller changes the fault status to active. The fault remains active until the Reset button is pressed.

Fail to Transfer

For utility-to-genset applications, this event is active if the transfer switch failed to move from Source 1 to Neutral or Neutral to Source 2 within a preset time limit.

For utility-to-utility and genset-to-genset applications, this event is active if the transfer switch failed to move from the preferred source to the backup source within a preset time limit.

For open transition transfer switches, the controller first verifies that the transfer switch moved from Source 2 to Neutral within the time limit defined in the Fail to Open Time Delay. The controller also verifies that the transfer switch moved from Neutral to Source 1 within the time limit defined in the Fail to Close Time Delay.

For closed transition transfer switches, the controller verifies that the ATS retransferred from Source 2 to Source 1 within the time limits.

If the time limits are exceeded, the controller changes the fault status to active. The fault remains active until the Reset button is pressed.

High Neutral Amps

This event is detected only on switches equipped with the Load Monitoring bargraph. This event is active when the neutral current (amps) exceeds the threshold for neutral current.

Load Shed

This event is active whenever the Load Shed input is active.

Motor Disconnect

This event is active whenever the Motor Disconnect input is active. This input causes the controller to enter a non-automatic mode; it does not try to move the transfer switch mechanism.

Network Battery Low

This event is detected by the optional Network Communications Module (NCM) and is active when the network lithium battery voltage is less than 5.0 VDC.

The event remains active until the Reset button on the front panel is pressed.

Network Error

This event is detected by the optional Network Communications Module (NCM) and is active when a network communications error is detected. This indicates that the device is no longer communicating with other devices on the network.

The event remains active until the Reset button on the front panel is pressed.

Network Wink

Network wink events are used by network service technicians to identify a particular network device.

Not in Auto

This event is active whenever the Not In Auto LED output is activated. This event is used to support the multiple Not In Auto conditions. This output has the same value (or status) as the hardware LED output located on the ATS front panel and the Relay Module output.

Whenever any of the Not In Auto events are true—including, Motor Disconnect Switch set to Off, Fail to Charge Spring, Controller is Offline, Control Lockout Active, and Fail to Disconnect—the control makes this event active.

Panel Lock Switch

This event will only occur on transfer switches equipped with the optional security key switch (see Figure 2-1). This event is active when the key switch is in the Panel Lock position. When the key switch is in the Panel Lock position, the front panel Test and Override pushbuttons are disabled and no changes to the setup menus can be made.

Phase Rotation Fail

This event is active whenever Source 1 and Source 2 voltages have difference phase sequences.

This feature is used to protect against equipment damage. It is only available on Level 2 controls. This feature is required in fire pump applications and is enabled by default. This feature monitors the phase rotation of the non-connected source in relation to the connected source. When the non-connected 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.

⚠ 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.***

Preferred Source 1

This event is active when the preferred source setting changes from Source 2 to Source 1. This event is only available on Level 2 controls in genset-to-genset and utility-to-utility applications.

Preferred Source 2

This event is active when the preferred source setting changes from Source 1 to Source 2. This event is only available on Level 2 controls in genset-to-genset and utility-to-utility applications.

Retransfer Inhibit

This event is active whenever the Retransfer Inhibit input is activated via any available input.

S1 Failed to Close

While attempting to transfer the load to Source 1, this event is detected if the control is not able to close the Source 1 contacts. This event is followed by a “Control Locked Out” event.

S1 Failed to Open

While attempting to transfer the load to Source 2, this event is active if the control is not able to open the Source 1 contacts. This event is followed by a “Control Locked Out” event.

S1 Frequency Fail

This event is active whenever Source 1 frequency is outside acceptable limits.

S1 Imbalance Fail

This event is active whenever Source 1 phase-to-phase voltage is outside acceptable limits.

This feature is used for equipment protection. It is used in three-phase applications and informs the operator when there is a significant voltage imbalance between the phases of Source 1 or Source 2. The imbalance is typically caused by severe single phase loading. To prevent nuisance faults, the setting can be increased up to ten percent of nominal voltage.

S1 Loss Phase

This event is active whenever Source 1 is missing one or more of its (three-phase) voltage sources.

This feature is mainly used to protect three-phase devices, like motors. It is only available on Level 2 controls, in a three-phase application. This feature initiates a transfer away from a source that has lost a single phase and it prevents transfer to a source that has lost a single phase. This is generally caused by a single phase to line ground or open.

S1 Over Voltage

This event is active whenever Source 1 voltage is greater than the acceptable limits.

S1 Stopped

This event indicates that Source 1 is not needed and is commanded by the ATS to stop. This event is used only in genset-to-genset applications.

S1 Under Voltage

This event is active when ever Source 1 voltage is less than the acceptable limits.

S2 Failed to Close

While attempting to transfer the load to Source 2, this event is detected if the control is not able to close the Source 2 contacts. This event is followed by a “Control Locked Out” event.

S2 Failed to Open

While attempting to transfer the load to Source 1, this event is active if the control is not able to open the Source 2 contacts. This event is followed by a “Control Locked Out” event.

S2 Frequency Fail

This event is activate whenever Source 2 frequency is outside acceptable limits.

S2 Imbalance Fail

This event is active whenever Source 2 phase-to-phase voltage is outside acceptable limits.

This feature is used for equipment protection. It is used in three-phase applications and informs the operator when there is a significant voltage imbalance between the phases of Source 1 or Source 2. The imbalance is typically caused by severe single phase loading. To prevent nuisance faults, the setting can be increased up to ten percent of nominal voltage.

S2 Loss Phase

This event is active whenever Source 2 is missing one or more of its (three-phase) voltage sources.

This feature is mainly used to protect three-phase devices, like motors. It is only available on Level 2 controls, in a three-phase application. This feature initiates a transfer away from a source that has lost a single phase and it prevents transfer to a source that has lost a single phase. This is generally caused by a single phase to line ground or open.

S2 Over Voltage

This event is active whenever Source 2 voltage is greater than the acceptable limits.

S2 Stopped

This event indicates that Source 2 is not needed and is commanded by the ATS to stop. This event is used in utility-to-genset and genset-to-genset applications.

S2 Under Voltage

This event is active whenever Source 2 voltage is less than the acceptable limits.

Sequencer Output 1 thru Sequencer Output 8

This event is active whenever the Load Sequencer outputs (1-8) change state.

The Load Sequencer feature consists of eight programmable timers which can control eight different network devices in a timed sequence. Each Load Sequencer output is an independent Event Announcement. This is necessary for the Network Communications Module (NCM) to receive and transmit event changes.

When these outputs are active, the transfer switch is typically inhibiting another transfer switch from loading the active source. This allows a gentle loading of a transfer switch when performing a transfer or retransfer sequence.

This event is used only in the utility-to-genset control mode.

Service Tool

This event is active whenever there is a PC Service tool connected to the controller.

Source-1 Available

This event is active whenever the Source 1 sensors (over/under voltage, over/under frequency, phase rotation, loss of phase, voltage imbalance) indicate that Source 1 is within acceptable limits. There is an associated LED output on the front panel and a relay output on the Relay Module.

Source-1 Connected

This event is active whenever the Source 1 position input is active. There is an associated LED output on the front panel, a relay output on the Relay Module, and a Digital Display screen that also indicate Source 1 is connected.

Source-2 Available

This event is active whenever the Source 2 sensors (over/under voltage, over/under frequency, phase rotation, loss of phase, voltage imbalance) indicate that Source 2 is within acceptable limits. There is an associated LED output on the front panel and a relay output on the Relay Module.

Source-2 Connected

This event is active whenever the Source 2 position input is active. There is an associated LED output on the front panel, a relay output on the Relay Module, and a Digital Display screen that also indicate Source 2 is connected.

Speed Adjust

This event is used to send a *Speed Adjust* message to a network generator control. The controller sends the message and logs the event.

This signal causes the genset to increase speed (1/2 Hz) to sync with the utility. This signal ends when the transfer is complete.

Sync Check Active

This event is active whenever an in-phase transfer (using the Sync Check Sensor) is pending.

Sync Enable

This event is only displayed if active synchronicity is enabled. This event becomes active when the control sends a *Sync Enable* message to a network generator control.

TDECa (Time Delay Engine Cool-Down (A))

This event is active whenever the Time Delay Engine Cool-Down (A) timer is active—also called the time delay stop. This event is inactive whenever the timer expires or is not active. The control activates this output whenever the control is cooling down the genset.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDECb (Time Delay Engine Cool-Down (B))

This event is active whenever the Time Delay Engine Cool-Down (B) timer is active—also called the time delay stop. This event is inactive whenever the timer expires or is not active. This time delay is used only with generator-to-generator control modes on the Source 1 operator. The control activates this output whenever the control is cooling down a genset.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDEL (Transfer Pending)

This event is active whenever the Elevator Pretransfer output is active. The control activates this event whenever a transfer pending signal is needed in the power system—this is typically used as an early warning signal for elevator systems. When the timer expires, the event becomes inactive.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDEN (Time Delay Source 2 (E) to Source 1 (N))

This event is active whenever the Time Delay Source 2 to Source 1 timer is active—also called the time delay retransfer. This event is inactive whenever the timer expires or is not active. The control activates this output when the control is counting down to transfer the switch from Source 2 to Source 1.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDESa (Time Delay Engine Start A)

This event is active whenever the Time Delay Start A timer is active. This event is inactive whenever the timer expires or is not active. The control activates this output whenever the control requires generator set (A) to start.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDESb (Time Delay Engine Start B)

This event is active whenever the Time Delay Start B timer is active. This event is inactive whenever the timer expires or is not active. The control activates this output whenever the control requires generator set (B) to start. This event is only present for controllers configured for genset-to-genset control mode.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDNE (Time Delay Source 1 (N) to Source 2 (E))

This event is active whenever the Time Delay Source 1 to Source 2 timer is active—also called the time delay transfer. This event is inactive whenever the timer expires or is not active. The control activates this output when the control is counting down to transfer the switch from Source 1 to Source 2.

The digital display displays this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

TDPT (Time Delay Programmed Transition)

This event is active whenever the programmed transition timer is active (whenever the control is delaying the transfer switch in the neutral position). This event is inactive whenever the timer expires or is not active.

The digital display shows this event when it becomes active. In addition, it displays an active countdown, in seconds, of the time delay.

Test In Progress

This event is active whenever a test sequence is active. There is an associated LED output on the front panel and a relay output on the Relay Module. When this event is active, the Test/Exercise Active LED on the front panel is lit and the Test/Exercise relay on the relay module is activated.

Test Start A

This event is active whenever the controller performs a Test sequence. The controller also activates the Emergency Start A output in order for the generator to interpret that a Test/Exercise start is called for. The genset will not start if only the Test Start A event is active.

Test Start B

This event is active whenever the controller performs a Test sequence on Source 2. This is only used in genset-to-genset applications. The controller activates the Emergency Start B output in order for the generator to interpret that a Test/Exercise start is called for. The genset will not start if only the Test Start B event is active.

Transfer Inhibit

This event is active whenever the Transfer Inhibit input is activated via any available input.

6. Troubleshooting

The following procedures describe preliminary troubleshooting checks. If the trouble persists, call your dealer or distributor for service.

Troubleshooting procedures are different when you have a transfer switch equipped with a digital display from when you do not have a digital display. You can view a fault message with the digital display, but without the digital display you must depend on ATS symptoms to diagnose the problem. Ten LED indicators located on the digital module may help in troubleshooting the transfer switch.

TROUBLESHOOTING USING THE LED INDICATORS

The digital module, located on the inside of the switch enclosure door, contains ten LED indicators (see Figure 32-1). 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.

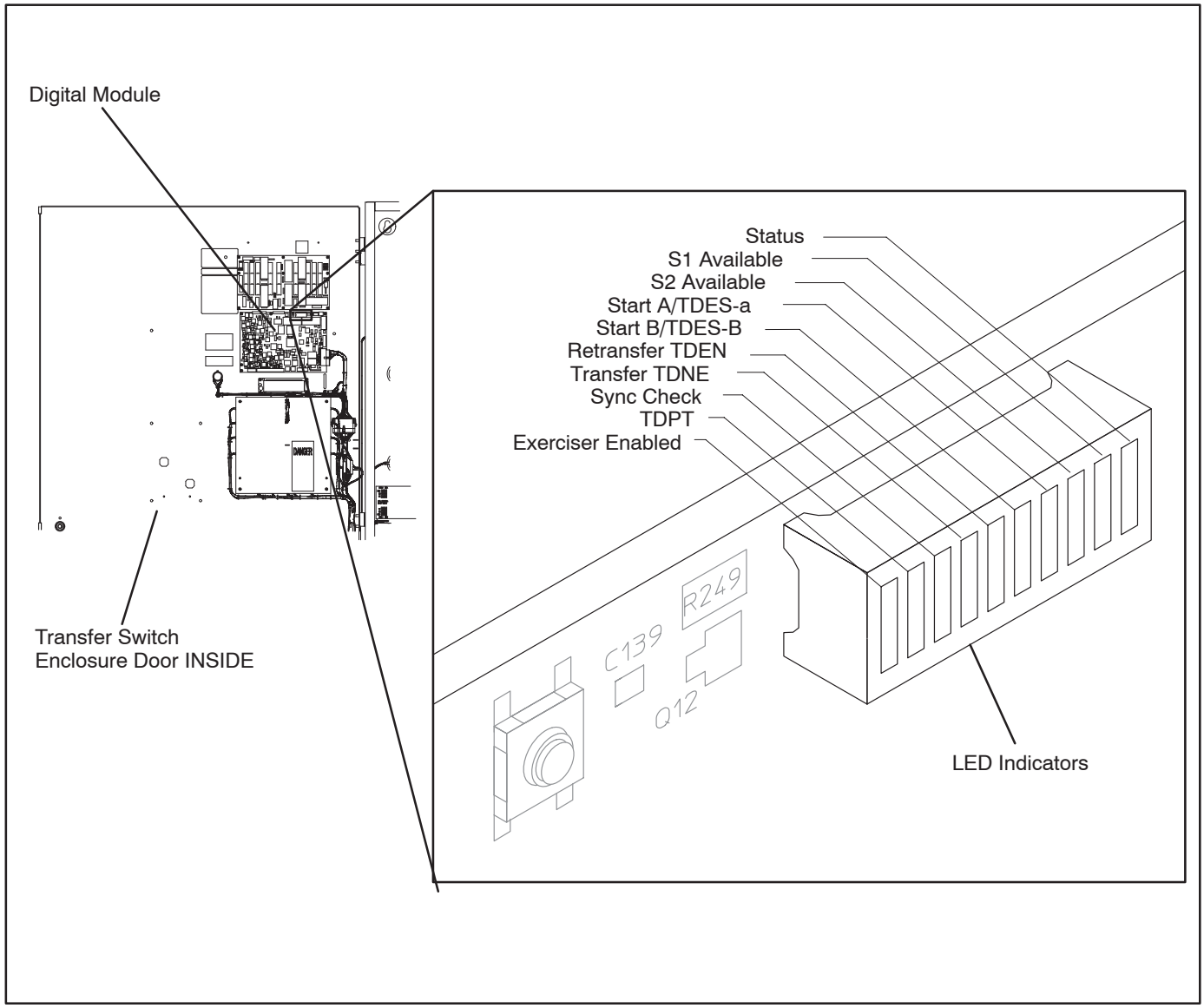


FIGURE 32-1. LED LOCATION ON DIGITAL MODULE (SHOWN ON LEVEL 1 SWITCH)

TABLE 6-1. DIGITAL MODULE LED INDICATORS

Indicator	Definition
Status	Blinks at a 1-second rate when the controller has power and the program is running without error. This indicator flashes the first event code of the events listed in Table 6-2 until the Reset button on the front panel is pressed. 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 a 1-second 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 a 1-second rate during the time delay to engine start (TDESb).
Retransfer/TDEN	1. Lights when the control energizes the Retransfer relay. 2. Blinks at a 1-second rate during the time delay to retransfer (TDEN).
Transfer/TDNE	1. Lights when the control energizes the Transfer relay. 2. Blinks at a 1-second rate during the time delay to transfer (TDNE).
Sync Check	Blinks at 1-second rate when the in-phase sensor is active (maximum of 120 seconds).
TDPT	Time Delay Programmed Transition Blinks at a 1-second rate during the programmed transition time delay.
Exerciser Enabled	Lights when the Exerciser clock is enabled and blinks during an exercise period. The operator can enable and disable the exerciser from the digital display when it is available.

Fault Flash-Out

While all events can be viewed with controls that include a Digital Display, the LED indicators on the Digital Module can also be used as indications of some events. This includes the events listed in Table 6-1. More information of these events is included in Section 5.

The Status LED indicator flashes fault flash-out codes for the events listed in Table 6-2. The control flashes the first active event code on the Digital Module Status indicator until the Reset button on the front panel is pressed (see Figure 2-1). The control flashes each digit of the event code with a pause between digits and a longer pause between repetitions.

All events, including the current event, are put into the event history file. This file can hold a maximum of 50 events. Use the digital display or the PC Service tool to read the contents of the event history file.

TABLE 6-2. FAULT FLASH-OUT CODES AND DISPLAY MESSAGES

Code	Display Message
167	Control Locked Out
441	Control Battery Low
477	Network Battery Low
597	Charger Error
1115	Fail to Charge Sprg
1121	Fail to Disconnect
1452	S2 Failed to Close
1453	S2 Failed to Open
1468	Network Error
2396	S1 Failed to Close
2397	S1 Failed to Open

TROUBLESHOOTING USING THE DIGITAL DISPLAY FAULT MESSAGES

⚠WARNING ***Some ATS service procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of electricity and machinery hazards should perform service. See Safety Precautions.***

The digital display can be used to view a list of events to help understand transfer switch operation and events that may require service. When the digital display is not available, diagnosis of problems involves observing system operation. If you cannot determine or correct the problem, contact you dealer or distributor for service.

Power Outage Occurs, But the Generator Set Does Not Start

⚠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.***

1. The operation selector switch on the generator set control panel should be set at Remote. Check for fault indicators on the generator set control.

2. Start the generator set using its start-stop controls. If it does not crank, check the starting batteries. If it cranks but does not start, check the fuel supply.

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

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

3. If the problem persists, call your dealer or distributor for service.

Generator Set Starts During Normal Power Service

1. The operation selector switch on the generator set control panel should be set at Remote.

   ⚠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.***

2. Check the Test/Exerciser Active indicator on the switch panel to see whether it is in an exercise period.

   NOTE: If the exercise period occurs at an unexpected time or for an excessive duration, refer to the exerciser clock programming procedure or call your dealer or distributor. The Exercise menu (see page 4-17) or the PC Service tool can be used to view exercise setup details.

3. Momentary voltage dips might cause voltage sensors to initiate generator set starting. If available, check the parameter settings in digital display Setup menu.

4. If the problem persists, call your dealer or distributor for service.

Generator Set Does Not Exercise

1. The operation selector switch on the generator set control panel should be set at Remote.

   ⚠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. When the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.***

2. Check the Test/Exerciser Active indicator on the switch panel to see whether it is in an exercise period.

3. If the Test/Exerciser Active indicator is on, check to see if the Exerciser Enable LED on the Digital Module is on. The LED will be on if an exercise period is set. The LED flashes when an exercise period is running. Use the Exercise menu (see page 4-17) or the PC Service tool to review the exercise settings and make any adjustments necessary to correctly set up the exercise.

4. Check to see if any exercise exceptions are active. Exercise exceptions can be viewed with the digital display (see page 4-19) or the PC Service tool.

5. Start the generator set using its start-stop controls. If it does not crank, check the starting batteries. If it cranks but does not start, check the fuel supply. If the problem persists, call your dealer or distributor for service.

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

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

After A Power Failure, The Generator Set Starts But Does Not Assume Load

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

1. Check to see if the Source 2 Available lamp on the Switch Panel is lit.

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

3. Check to verify that the Not In Auto lamp in the Switch Panel is not flashing. The transfer switch is Not In Auto when:

   - *The Motor Disconnect Switch is set to Off* – Open the cabinet door and check to verify that the Motor Disconnect switch is in the Auto position.
   - *There is an active Fail to Disconnect event* – This event applies to only closed transition modes. Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *There is an active Fail to Charge Spring event* – Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *The control is locked out* – Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *P12 is disconnected from the Power Module* – Check the P12/J12 connection on the Power Module to make sure it is securely attached (see Figure 32-2).

- *The controller is set to Offline* – This will only occur when a spare control board is installed. The ATS configuration can be viewed with the digital display About sub-menus (see page 4-24) or the PC Service tool. If set to Offline, contact your dealer or distributor for service.
- *The optional Operator Release key switch is in the Unlocked (Manual) position* – This only applies to models that include the optional external manual operation handle. Turn the Operator Release key switch to the Locked (Auto) position.

  NOTE: The transfer switch automatically transfers to the preferred source when the Operator Release key switch is in the Locked (Auto) position.

4. Make sure the transfer time delay (TDNE) has expired. Check the active time delay menu (see page 4-14) or the status of the Transfer TDNE LED on the digital module to see if it is flashing (see page 6-1).

5. Make sure that there is not an active load shed or transfer inhibit. Check the event history log with the digital display or the PC Service tool to see if either of these events are active.

6. If the problem persists, call your dealer or distributor for service.

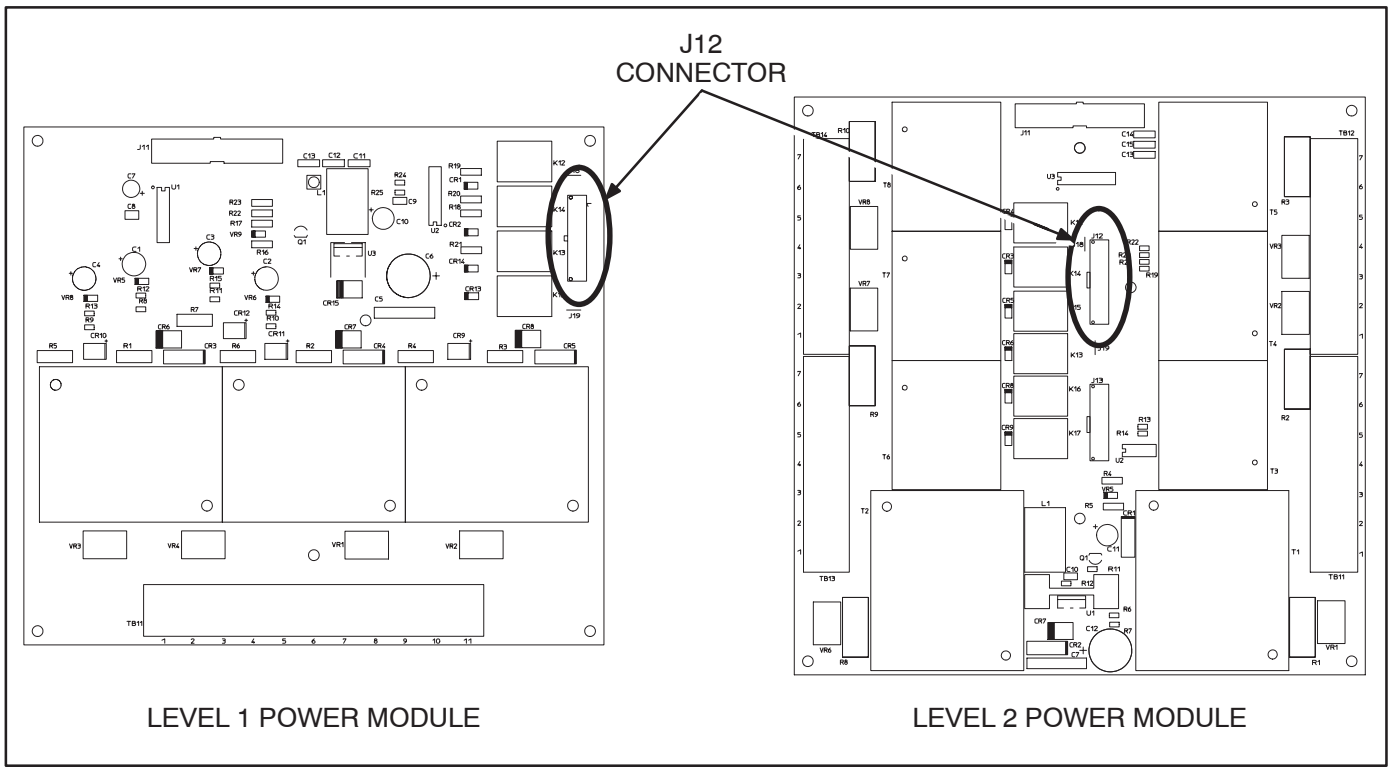


FIGURE 32-2. POWER MODULE J12/P12 CONNECTIONS

After Power Returns, The Transfer Switch Does Not Return To Normal Position

⚠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. When the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.***

1. Check to see if the Source 1 Available lamp on the Switch Panel is lit.

2. Make sure that there is not an active retransfer inhibit.

3. Verify that both sources have synchronized.

4. The retransfer time delay (TDEN) period may not have expired. Check the event history log on the digital display or check the Retransfer Timing lamp on the Digital Module. To bypass a retransfer time delay, press the Override button on the front panel.

5. Check to verify that the Not In Auto lamp in the Switch Panel is not flashing. The transfer switch is Not In Auto when:

   - *The Motor Disconnect Switch is set to Off* – Open the cabinet door and check to verify that the Motor Disconnect switch is in the Auto position.
   - *There is an active Fail to Disconnect event* – This event applies to only closed transition modes. Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *There is an active Fail to Charge Spring event* – Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *The control is locked out* – Use the digital display or the status LED indicators on the Digital Module to see if this event is active. If active, press the Reset button on the front panel. If the problem persists, contact your dealer or distributor for service.
   - *P12 is disconnected from the Power Module* – Check the P12/J12 connection on the Power Module to make sure it is securely attached (see Figure 32-2).
   - *The controller is set to Offline* – This will only occur when a spare control board is installed. The ATS configuration can be viewed with the digital display About submenus (see page 4-24) or the PC Service tool. If set to Offline, contact your dealer or distributor for service.
   - *The optional Operator Release key switch is in the Unlocked (Manual) position* – This only applies to models that include the optional external manual operation handle. Turn the Operator Release key switch to the Locked (Auto) position.

     NOTE: The transfer switch automatically transfers to the preferred source when the Operator Release key switch is in the Locked (Auto) position.

6. Make sure the transfer time delay (TDNE) has expired. Check the active time delay menu (see page 4-14) or the status of the Transfer TDNE LED on the digital module to see if it is flashing (see page 6-1).

7. Make sure that there is not an active load shed or transfer inhibit. Check the event history log with the digital display (see page 4-7) or the PC Service tool to see if either of these events are active.

8. If the switch still does not retransfer, call your dealer or distributor for service.

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

The stop time delay function may not yet have expired. If the generator is running, the Start A/TDES-a LED indicator on the digital module is lit. Stop the generator set with its Start/Stop switch, and call your dealer or distributor for service.

Battery Charger Fails To Charge (If Equipped)

Check the battery charger fuse(s). Replace, if necessary, with fuses of the correct rating. Fuse ampere ratings are shown on the charger faceplate.

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

If the fuse is OK, call your dealer or distributor for service.

Battery Loses Water

The battery charger float voltage could be too high (if equipped with battery charger). The float setting may need adjusting. Call your dealer or distributor.

Battery Loses Charge

Battery charger float voltage could be too low (if equipped with battery charger). The float setting may need adjusting. Call your dealer or distributor for service.

Network Battery Low

Press the Reset button on the front panel. If the problem persists, replace the network module batteries.

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7. Glossary

Table 7-1 is a list of other common terms associated with OHPC/CHPC transfer switches. Table 7-2 lists defines time delay terms.

TABLE 7-1. OHPC/CHPC TERMS

CATEGORY	TERM	DEFINITION
Transfer Switch Types	Automatic Transfer Switch (ATS)	An electro-mechanical device that is used to connect an electrical load to either one of two power sources.
	Closed Transition ATS	A type of ATS that parallels two power sources for a pre-determined period of time. Closed transition operation only occurs when both power sources are available. Otherwise, the ATS acts in Open Transition mode.
	Open Transition ATS	A type of ATS that disconnects the load from both power sources and then reconnects it to an available (or desired) power source.
Control Configurations	Generator to Generator Control	A type of control where both sources of ATS power are generator sets (Prime Power) or two generator sets are used to back up utility power (Dual Stand-By).
	Dual Stand-By Operation	This configuration is only used with generator-to-generator applications. In Dual Stand-By applications, two gensets are used to back up utility power. Either genset can be designated as the preferred backup genset. The control can also be set to alternate between the two gensets when the utility fails.
	Prime Power (Plant to Plant) Operation	This configuration is only used with generator-to-generator applications. In Prime Power applications, one generator is always running and supplying power to the load while the other genset is the backup genset. Either genset can be designated as the preferred source or a time delay can be set up to change the preferred source automatically.
	Utility to Generator Control	A type of control where the utility is the preferred power source and a standby generator is used to back up the utility service.
	Utility to Utility Control	A type of control where both sources of power are utility services. With this type of control, you can manually select which utility service is the preferred source.

TABLE 7-1. OHPC/CHPC TERMS (CONTINUED)

CATEGORY	TERM	DEFINITION
Features	Transfer Inhibit	A feature that prevents the load from being transferred to a backup source unless the Override button on the switch panel is pressed.
	Retransfer Inhibit	A feature that prevents the ATS from automatically transferring the load back to Source 1 (or the preferred source in genset-to-genset applications) until the Override button on the switch panel is pressed or Source 2 (or the backup source in genset-to-genset applications) fails.
	Test With or Without Load	A feature that allows the operator transfer the load during an automatic test of the transfer switch, generator, and power system or only test the generator (without load).
	Programmable Generator Exerciser	For utility-to-genset configurations, this feature allows for the programming of scheduled generator exercises. In most cases, an exercise is programmed to be recurring but it can also be set up to exercise one time only.
	Exercise Exceptions	This feature allows for a time period when scheduled exercises will not take place.
	Sleep Mode	The state of the digital display in which the screen goes blank after a period of screen inactivity. Screen inactivity is when there is no user interaction with the menu system and when there are no new events.
Sensors	Frequency Sensing	A sensor is used to monitor a power source to detect high or low frequency and initiate a transfer to a second source if it detects a high or low frequency condition over a specified period of time. The sensor initiates a retransfer when the original power source returns to an acceptable frequency value.
	Loss of Single Phase Sensing	On three phase Level 2 controllers, a sensor monitors both sources and 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.
	Over Voltage Sensing	A sensor is used to monitor a power source to detect high voltage and initiate a transfer to a second source if it detects a high voltage condition over a specified period of time. The sensor initiates a retransfer when the original power source returns to an acceptable voltage value.
	Phase Rotation Sensing	A sensor monitors the phase rotation of the source opposite from the connected source and prevents transfer to that source if is out of phase rotation.
	Sync Check Sensing	A sensor monitors both power sources to see if they are within specified tolerances of frequency, voltage, and relative phase difference (phase rotation and voltage imbalance) before allowing the load to be transferred. Sync Check sensing overrides the program transition routine.
	Under Voltage Sensing	A sensor is used to monitor a power source to detect low voltage and initiate a transfer to a second source if it detects a low voltage condition over a specified period of time. The sensor initiates a retransfer when the original power source returns to an acceptable voltage value.
	Voltage Imbalance Sensing	On three phase Level 2 controllers, sensors are used to monitor both sources and inform the operator when there is significant voltage imbalance between the phases of both sources.

TABLE 7-1. OHPC/CHPC TERMS (CONTINUED)

CATEGORY	TERM	DEFINITION
Miscellaneous	Contact Assemblies	Mechanical devices that allow or prevent current flow from a power source to the load.
	Auxiliary Relay	A contact for energizing external alarms, remote indicators, and control equipment such as louver motors and water pumps.
	Cassette	A device that holds movable contacts, load bars, and the lugs for connecting to two power sources.
	Actuator	A device that automatically moves the contact assemblies between the contacts of two available power sources.
	Float Battery Charger	A device used to regulate charge voltage so it can continuously charge without damaging the battery.
	Load Sequencing	The process of turning loads on in sequence after a transfer or retransfer.
	Load Shedding	The process of disconnecting the load from an available power source in order to reduce the power being consumed from that source.
	Motor Disconnect Switch	A device that enables or disables automatic operation of the transfer switch.
	Neutral Position	The position of the transfer switch in which neither power source is connected to the load.
	Programmed Transition	An intentional programmable pause of the transfer switch in the Neutral position during the transfer from one power source to another.
	Transfer Time	The amount of time it takes for the transfer switch to break from one power source and reconnect to the other source.

TABLE 7-2. TIME DELAY GLOSSARY

TIME DELAY	ABBREVIATION	DEFINITION
Start Time Delay	TDES	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 the generator set from starting during short power interruptions. Timing starts at the 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 the PC Service tool or the digital display when it is available.
	TDESa and TDESb	For genset-to-genset applications, TDESa is the start time delay to start Source 2 genset and TDESb is the start time delay to start Source 1 genset. For utility-to-utility applications, TDESa and TDESb are not available.
Stop Time Delay (Cool-down)	TDEC	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 the PC Service tool or the digital display when it is available.
	TDECa and TDECb	For genset-to-genset applications, TDECa is the stop time delay to stop Source 2 genset and TDECb is the stop time delay to stop Source 1 genset. For utility-to-utility application, TDECa and TDECb are not available.
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. TDNE is the delay from preferred source to backup source in utility-to-utility and genset-to-genset applications.
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 Source 1 power 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. TDEN is the delay from backup source to preferred source in utility-to-utility and genset-to-genset applications.
Programmed Transition Time Delay	TDPT	This delay is the time that the switch spends in the neutral position, when neither source is connected to the load, during a transfer or a retransfer. It begins when the switch moves to the neutral position and opens the contacts of the switch connected to the load. After the delay the control transfers the load. This time delay allows residual voltage of inductive loads to decay sufficiently before connecting it to another source. It is adjustable from 0 to 60 seconds in 1 second increments. The default value is 0 seconds. The proper adjustment is a function of the load. This feature is enabled by default. The value is set with the PC Service tool or the digital display when it is available.
Elevator Pretransfer Time Delay	TDEL	The Elevator Pre-Transfer Delay Signal delays transfer (or retransfer) for a specified time to give warning to an elevator control that a transfer (or retransfer) is about to occur. It is adjustable from 0 to 60 seconds in 1 second increments. The default value is 0 seconds. This feature is enabled by default. The value is set with the PC Service tool or the digital display when it is available.

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