Operator Manual

Transfer Switch

40–1000 Amps

OTECSE

English
Original Instructions

11-2014

962–0136 (Issue 5)

Table of Contents

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 keys.

Due to the serious shock hazard from high voltages within the cabinet, all service and adjustments to the transfer switch must be performed only by an electrician or authorized service representative.

UTILITY-TO-GENSET APPLICATIONS

If the cabinet must be opened for any reason:

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

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

GENERAL PRECAUTIONS

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

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

Wear safety glasses whenever servicing the transfer switch and do not smoke near the batteries.

Do not work on this equipment when mentally or physically fatigued, or after consuming alcohol or any drug that makes the operation of equipment unsafe.

⚠ WARNING

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

OTECSE-1

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 an OTECSE transfer switch. This is an open transition and programmed service entrance transfer switch that includes an automatic transfer switch (ATS) control. With an open transition switch, there is never a time when both sources are supplying power to the load.

Programmed transition switches briefly pause in the neutral position of the transfer switch, between switched positions, so that transient currents from the load can diminish before the load is switched to the other source.

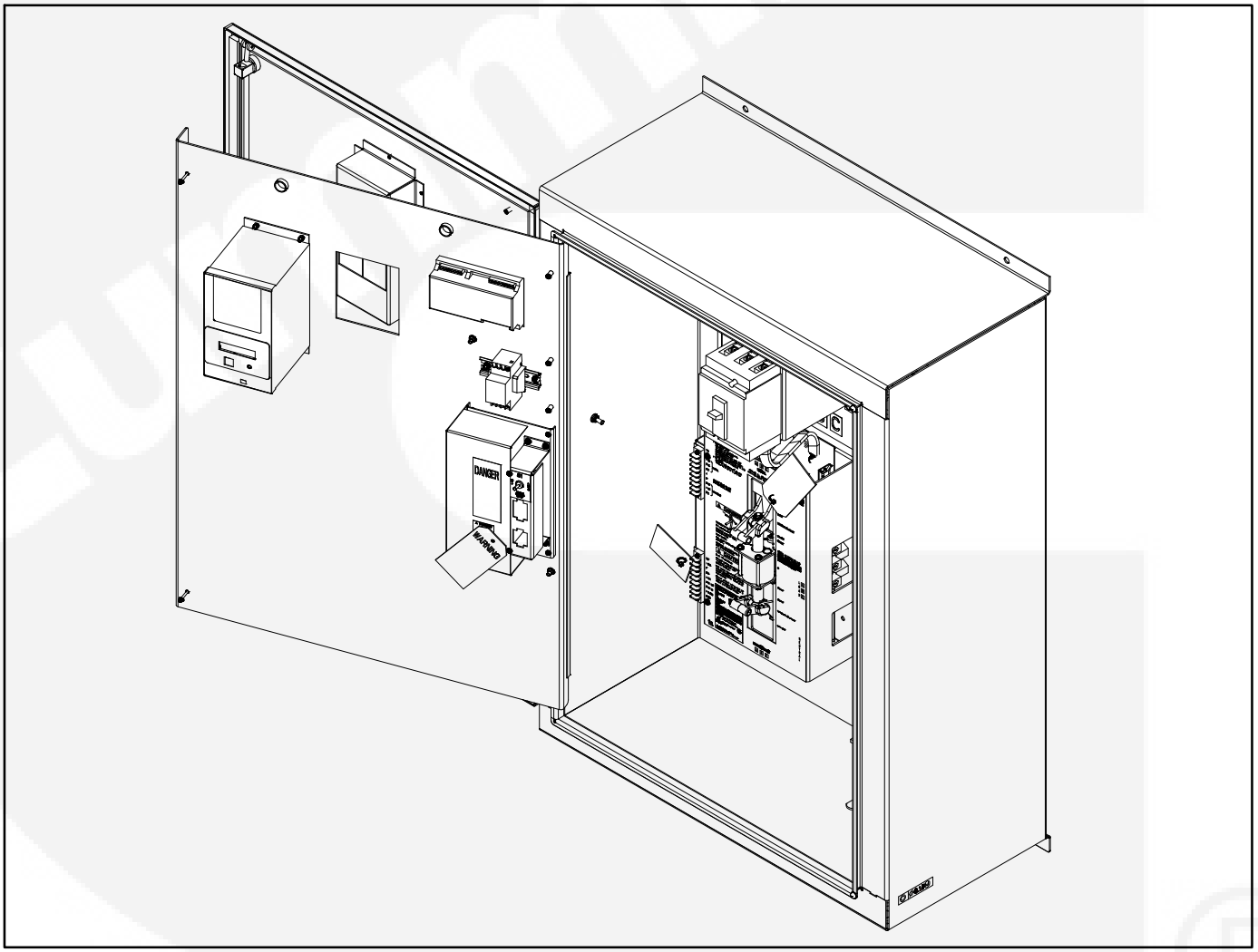

FIGURE 1-1. OTECSE TRANSFER SWITCH (40–125 AMP SWITCH, TYPE 3R AND 12 CABINET SHOWN)

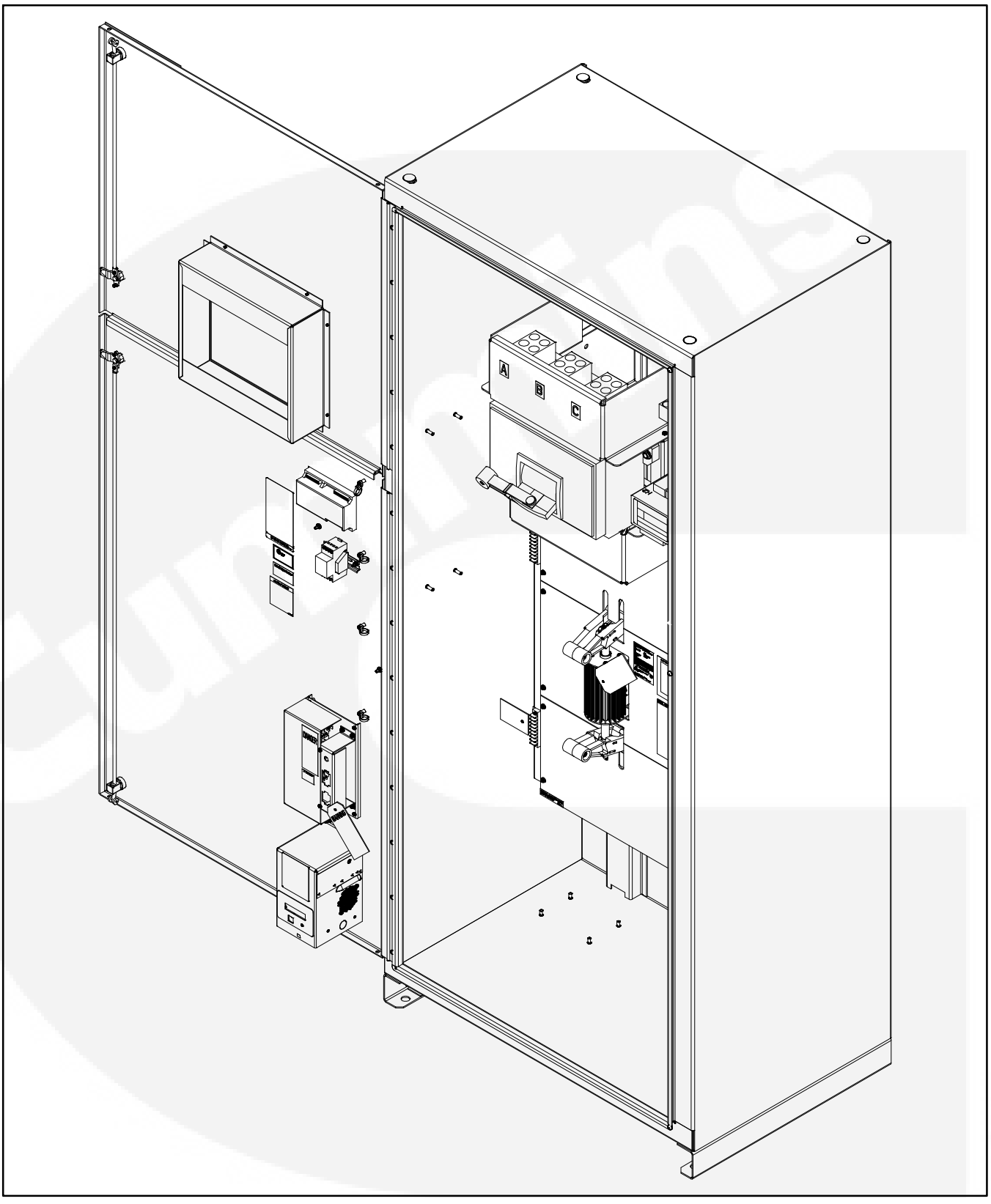

FIGURE 1-2. OTECSE TRANSFER SWITCH (800 AMP SWITCH, TYPE 1 CABINET SHOWN)

TRANSFER SWITCH APPLICATION

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

The load is connected to the common of the ATS (Figure 1-3). Under normal conditions, the load is supplied with power from the utility (as illustrated). If utility power is interrupted, the load is transferred to the generator set (genset). When utility power returns, the load is retransferred to the utility. The transfer and retransfer of the load are the two most basic functions of a transfer switch.

TRANSFER SWITCH FUNCTION

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

This automatic transfer switch, capable of automatic operation without operator intervention, is designed for utility-to-genset applications. In utility-to-genset applications, the transfer switch performs the following functions:

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

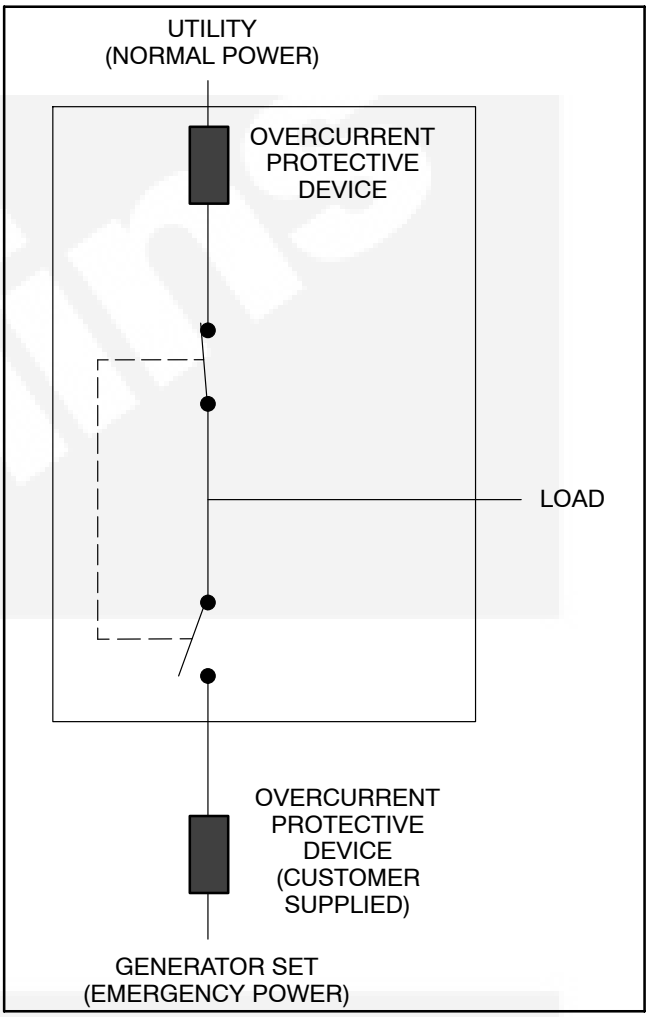

FIGURE 1-3. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

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.

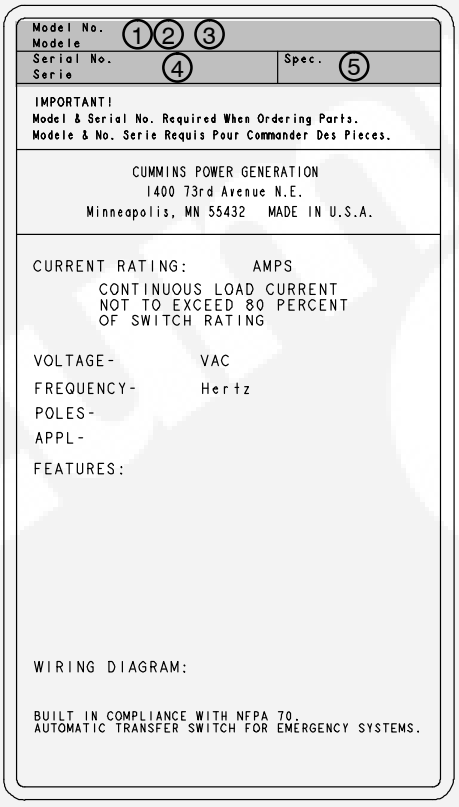

FIGURE 1-4. NAMEPLATE

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

OTECSEA0000000
| | |
1 2 3

Serial Number **Spec.A**
| |
4 5

1. OTECSE - Service entrance transfer switch model

2. Ampere Rating:
   A = 40, 70, 100, 125
   B = 150, 200, 225, 250
   C = 300, 400, 600
   D = 800, 1000

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

4. 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 1–763–528–7290.

When contacting your distributor, always supply the complete Model, Specification, and Serial Number as shown on the nameplate (see Figure 1-4).

2. Transfer Switch Start-Up

The OTECSE transfer switch is preset at the factory to operate using default settings. The control will operate the transfer switch when power is applied. However, you may wish to adjust some of the settings for better performance.

The transfer switch must be installed correctly, with DC power present, before any adjustments to the configuration can be made. If the transfer switch is connected to utility power, the Utility Power Connected LED will be lit if battery power is available. Utility or generator set voltage need not be present to adjust the configuration.

The following tables show which control functions should not be changed (Table 2-1) and which functions can be changed for your application (Table 2-2). Refer to *Section 5* for more details.

TABLE 2-1. FUNCTIONS THAT SHOULD NOT BE CHANGED

Function	Factory Setting
System Nominal Voltage Table	Set for your system voltage
System Nominal Voltage	Set for your system voltage
System Nominal Frequency	Set for your system frequency
System Phase	Set for your system
External Exercise	Set to “On” if the external exerciser option was ordered; otherwise, set to “Off”

TABLE 2-2. FUNCTIONS THAT CAN BE CHANGED

Function	Factory Setting
TDES (Time Delay Engine Start)	3 Seconds
TDNE (Time Delay Normal to Emergency)	5 Seconds
TDEN (Time Delay Emergency to Normal)	10 Minutes
TDEC (Time Delay Engine Cooldown)	10 Minutes
TDPT (Time Delay Programmed Transition)	0 Seconds
TDEL (Time Delay Elevator Signal)	0 Seconds
Test With or Without Load	Without Load
Exercise With or Without Load	Without Load
Utility Undervoltage Pickup	90%
Utility Undervoltage Dropout	85%
Phase Check	Off
Return to Programmed Transition	Off
Elevator Post Transfer Delay	Off
Exercise Repeat Interval	Every 7 Days

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3. Description

This section describes the control cabinet, the switch mechanism, and the standard and optional control features available with the OTECSE transfer switch.

CABINET

Cabinets are available in various configurations that meet UL and National Electrical Manufacturer's Association (NEMA) requirements. Each cabinet includes an identification label. The standard cabinet offerings are:

- Type 1 Indoor – General Purpose
- Type 3R Outdoor – Rainproof
- Type 12 Indoor – Dust Tight

Examples of cabinets are shown in Figures 3-1 through 3-4.

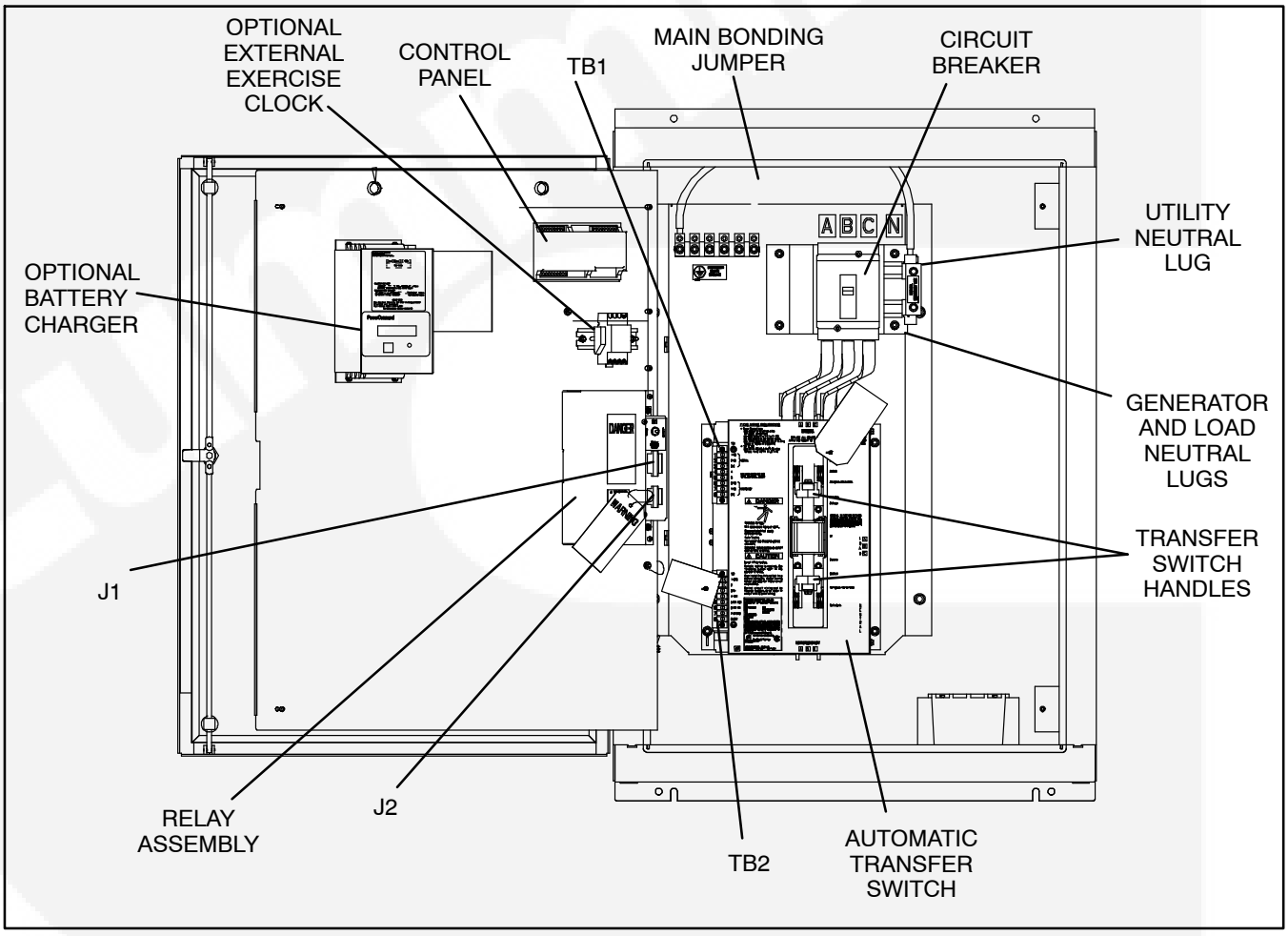


FIGURE 3-1. INTERIOR/COMPONENTS: 40–125 AMP, 3 POLE SWITCH, TYPE 3R AND 12 CABINET

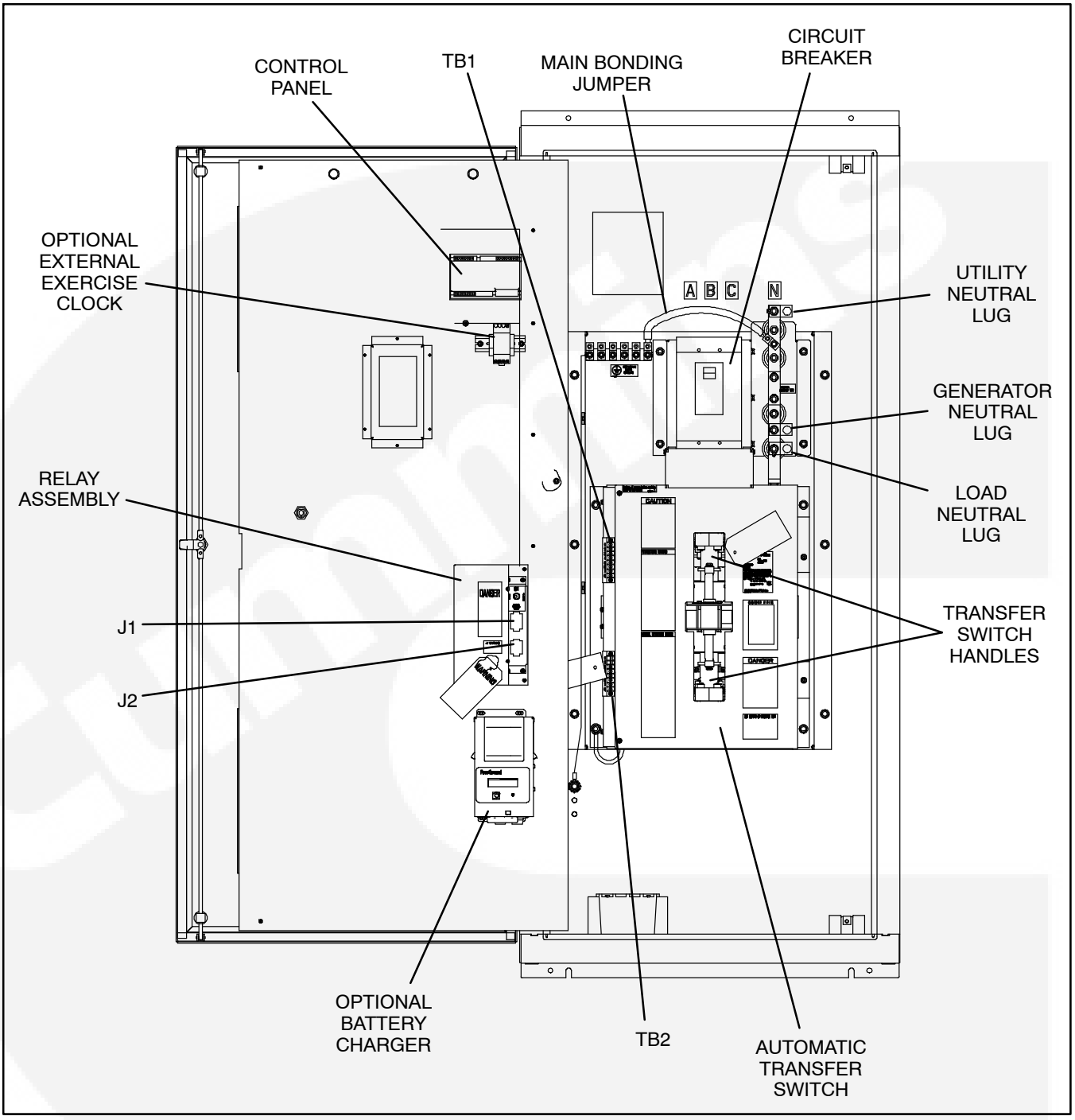


FIGURE 3-2. INTERIOR/COMPONENTS: 150–250 AMP, 3 POLE SWITCH, TYPE 3R AND 12 CABINET

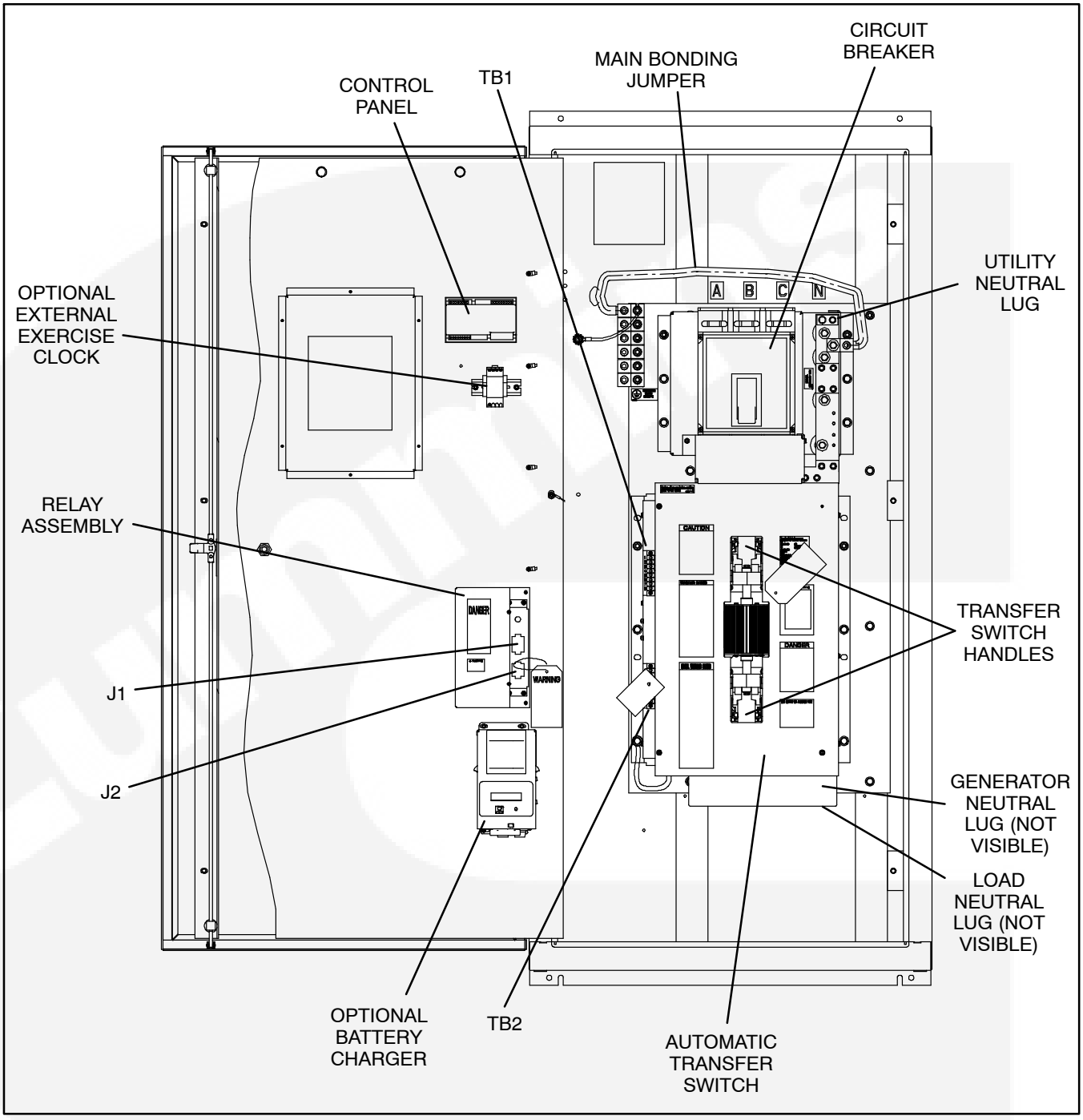


FIGURE 3-3. INTERIOR/COMPONENTS: 300–600 AMP, 4 POLE SWITCH, TYPE 3R AND 12 CABINET

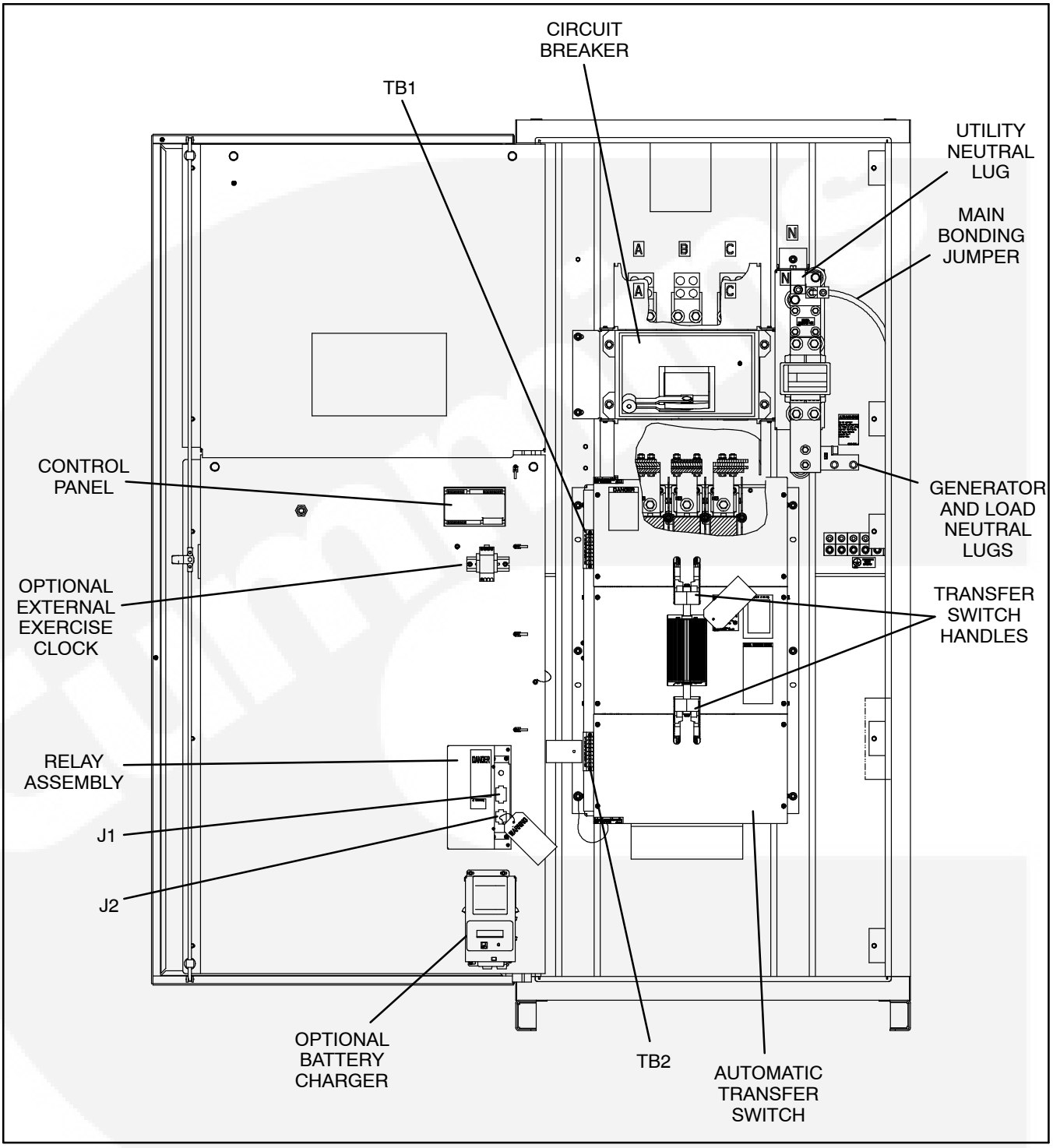


FIGURE 3-4. INTERIOR/COMPONENTS: 800–1000 AMP, 3 POLE SWITCH, TYPE 3R AND 12 CABINET

CONTROL PANEL

Figure 3-5 shows the control panel on the cabinet door. The control features are divided into three groups:

- Control Function LEDs
- ATS Status LEDs
- Membrane Pushbuttons

Control Function LEDs

The control panel (see Figure 3-5) includes eight LEDs that display codes that indicate various control functions that can be configured. The first five LEDs display the function code and the last three LEDs display the value code for the displayed function. For information on configuring these functions, see *Section 5*.

With the exception of the first LED (Test), normally these LEDs are off and are only lit when in Configuration Mode. The Test LED is also used to notify the user of test periods.

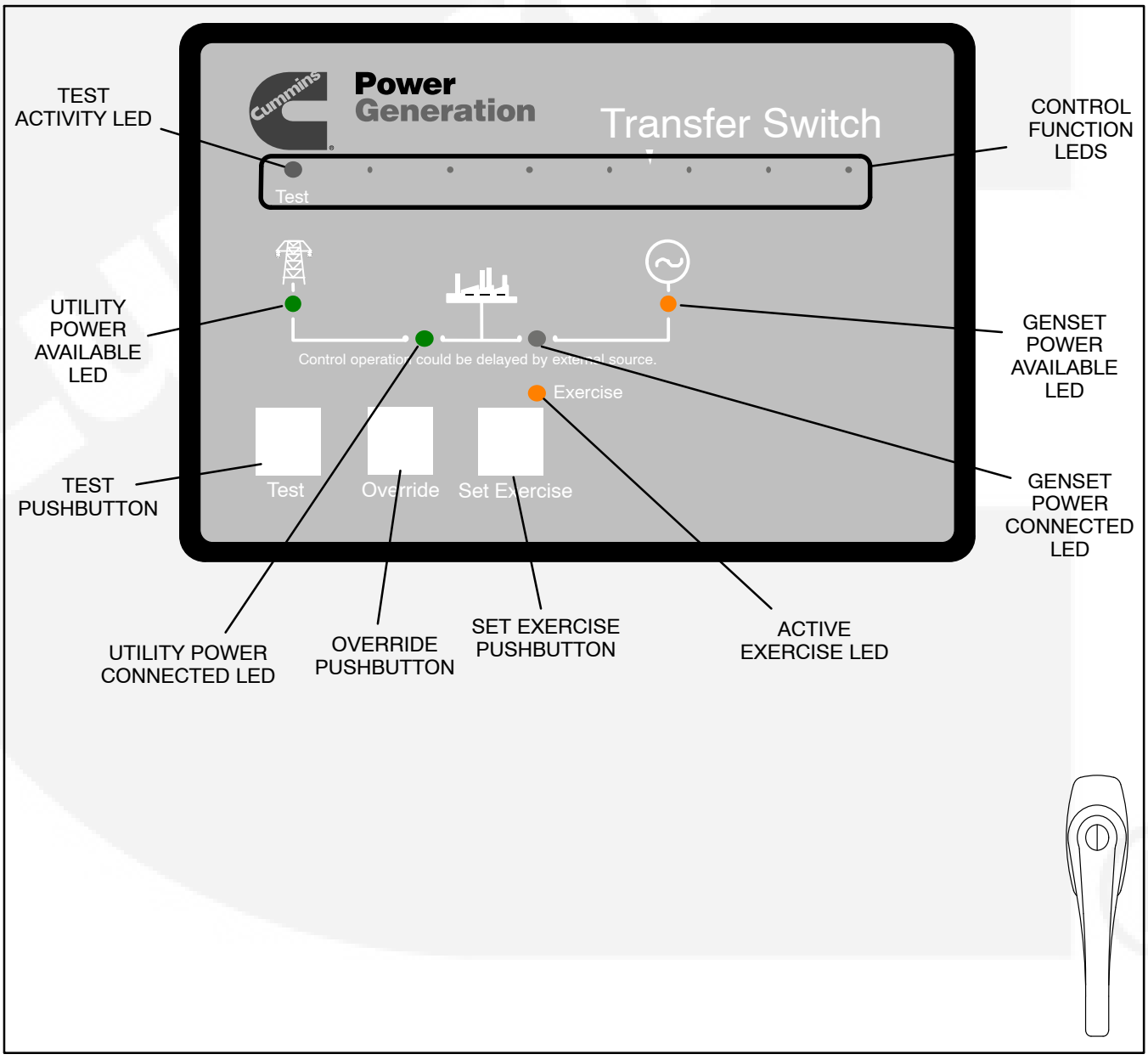


FIGURE 3-5. CABINET DOOR

ATS Status LEDs

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

Utility Power Available – This green LED is lit when the utility power source has acceptable output voltage.

Genset Power Available – This amber LED is lit when the generator set power source has acceptable output voltage and frequency.

Both power source LEDs can be lit simultaneously.

Utility Power Connected – This green LED is lit when utility power is supplying power to the load.

This LED flashes once per second if there is a failure to connect to or disconnect from utility power, when commanded. The control makes five attempts (there is ten seconds between each attempt) to connect to or disconnect from utility power before it flashes the failure.

Genset Power Connected – This amber LED is lit when the generator set is supplying power to the load.

This LED flashes once per second if there is a failure to connect to or disconnect from the generator set, when commanded. The control makes five attempts (there is ten seconds between each attempt) to connect to or disconnect from the generator set before it flashes the failure.

Test – This amber LED is lit when there is an active test period. This LED flashes twice per second when the Test pushbutton is pressed to set or cancel a test period.

Exercise – This amber LED lights when repeat exercise periods have been set. This LED flashes twice per second when the Set Exercise pushbutton is pressed to set or cancel an exercise. This LED flashes once per second during an active exercise period.

Membrane Pushbuttons

The control panel includes three membrane pushbuttons.

Test – The Test pushbutton is used to set or cancel a test period. The control can be configured to test the generator set with or without load. For more information, see *Section 4*.

The Test pushbutton is also used in the Configuration Mode to step through the function codes (see *Section 5*).

Override – The Override pushbutton is used to terminate or bypass some time delays, to stop the Power Connected LEDs from flashing as a result of a failure to connect to or disconnect from a power source, and to cancel an active exercise period. For more information, see *Section 4*.

The Override pushbutton is also used in the Configuration Mode to step through the value codes (see *Section 5*).

Set Exercise – The Set Exercise pushbutton is used to set or cancel repeat exercise periods using the integrated exerciser. For more information, see “Integrated Exercises” on page NO TAG.

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.***

Installation of these components and calibration and adjustment procedures are described in the *Installation Manual* (shipped with the transfer switch) and in the *Service Manual* (available through your distributor).

⚠WARNING ***Accidental actuation of the linear motor could cause severe personal injury.***

⚠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.***

Transfer Inhibit Input

A transfer inhibit input is set up by connecting a dry (voltage free) contact between TB2-6 and TB2-8. Closing the contact enables the feature and opening the contact disables it.

This feature is used to control load transfer to generator sets. When enabled, load transfer will not take place unless the Override pushbutton on the control panel is pressed or the transfer inhibit input is disabled.

Pressing the Override pushbutton on the control panel bypasses the transfer inhibit input and bypasses TDNE. The TDNE runs if the transfer inhibit input is disabled.

Retransfer Inhibit Input

A retransfer inhibit input is set up by connecting a dry (voltage free) contact between TB2-7 and TB2-8. Closing the contact enables the feature and opening the contact disables it.

This feature is used to prevent the ATS from automatically transferring the load back to the utility. When enabled, load transfer will not take place unless the Override pushbutton on the control panel is pressed, the retransfer inhibit input is disabled, or the generator set fails. If the generator set fails, retransfer inhibit is ignored.

Pressing the Override pushbutton on the control panel bypasses the retransfer inhibit input and bypasses the TDEN. The TDNE runs if the retransfer inhibit input is disabled.

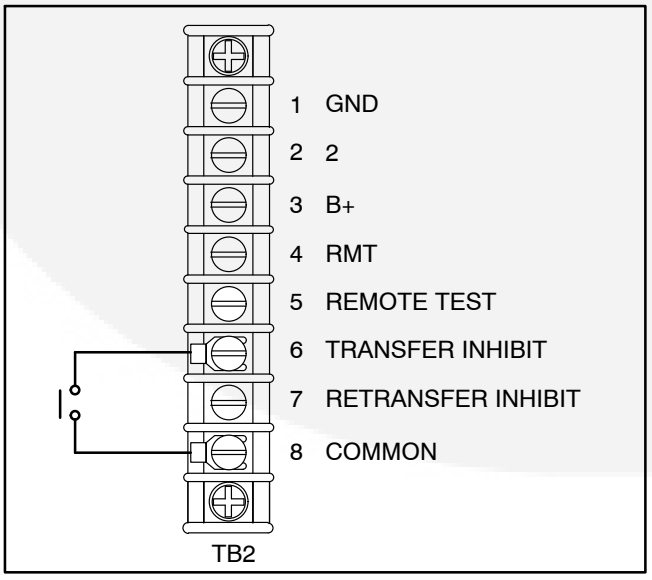


FIGURE 3-6. TB2 CONNECTIONS FOR TRANSFER INHIBIT

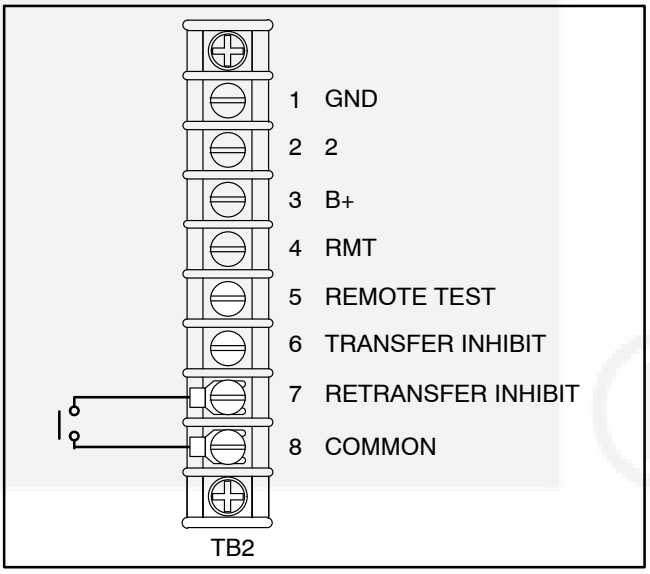


FIGURE 3-7. TB2 CONNECTIONS FOR RETRANSFER INHIBIT

Remote Test Input

The transfer switch may be wired for a remote test input. The switch is used to start and stop manually initiated system tests. As with the control panel Test pushbutton, the remote test input can be configured to test with or without load. More information on testing is included in *Section 4*.

A remote test input is set up by connecting a dry (voltage free) contact between TB2-5 and TB2-8. Closing the contact starts a test and opening the contact cancels the test. The Test LED flashes to signify the start of a test and stays on during the test.

Closing the contact causes the transfer switch to sense a (simulated) utility power failure and sends a start/run signal to the generator set. If the control is set up to test with load, the load is transferred to the generator set when the generator set becomes available. The Utility Power Available LED remains on to show that the utility did not fail.

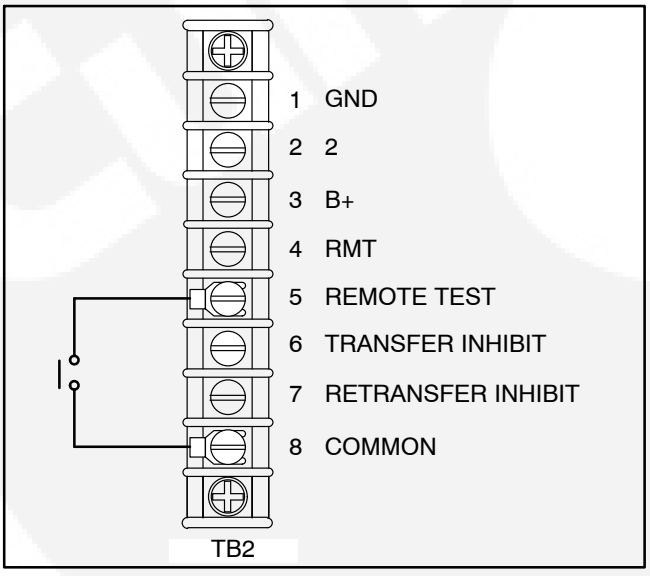


FIGURE 3-8. TB2 CONNECTIONS FOR REMOTE TEST TRANSFER

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 OTECSE transfer switches.

TRANSFER SWITCH

The transfer switch (see Figures 3-1 through 3-4) opens and closes the contacts that transfer the load between the power sources. The switch is mechanically interlocked to prevent simultaneous closing to both power sources. The main parts of the switch discussed here are the contact assemblies, linear actuator, and auxiliary contacts.

Contact Assemblies

The automatic transfer switch has either three or four poles. The contact assemblies make and break the current flow. When closed to either power source the contacts are mechanically held. A mechanical interlock prevents them from closing to both power sources at the same time.

Linear Actuator

The linear actuator is a linear induction motor that moves the contact assemblies between the contacts of both power sources. Linear actuator operation is initiated automatically by the transfer switch control. Manual operation of the switch is also possible. Refer to “Manual Operation” in *Section 4*.

Auxiliary Contacts

Auxiliary contacts are provided on the utility and generator set sides of the transfer switch (see Figure 3-9). They are actuated by operation of the transfer switch during transfer and retransfer. The utility auxiliary contact switch is actuated when the transfer switch connected to the utility. The generator set auxiliary contact switch is actuated when the transfer switch is connected to the generator set. The auxiliary contacts have current ratings of 10 amperes at 250 VAC. The contacts are wired to terminal block TB1.

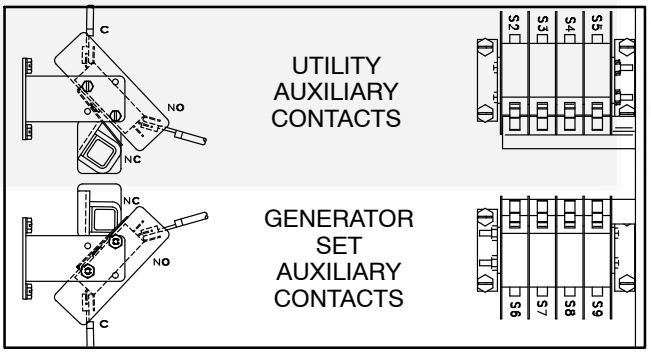


FIGURE 3-9. AUXILIARY CONTACTS

CIRCUIT BREAKER TRIP UNITS

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

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

The circuit breaker trip units are preset at the factory. The default settings are listed in the following tables.

Circuit Breaker STR23SP Trip Unit Settings

Rated Switch Amperage	Io	Ir	Im
150A	1	1	6
200A	0.8	1	6
225A	0.9	1	6
250A	1	1	6

Circuit Breaker Micrologic 3.0 Trip Unit Settings

Rated Switch Amperage	Ir	tr	Ii
300A	0.5	0.5	1.5
400A	0.67	0.5	1.5
600A	1	0.5	1.5

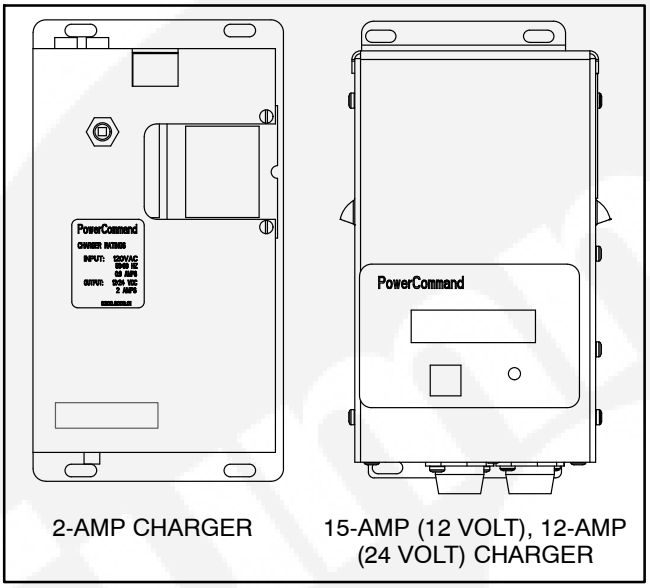
Circuit Breaker Micrologic 6.0 Trip Unit Settings

Rated Switch Amperage	Ir	tr	Isd	tsd	Ii	Ig	tg
800A	0.8	0.5	1.5	0 (Off)	2	A	0.1
1000A	1	0.5	1.5	0 (Off)	2	A	0.1

OPTIONS

Float Battery Charger Options

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



2-AMP CHARGER

15-AMP (12 VOLT), 12-AMP (24 VOLT) CHARGER

FIGURE 3-10. CURRENT BATTERY CHARGERS

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

2-Amp Battery Charger

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

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

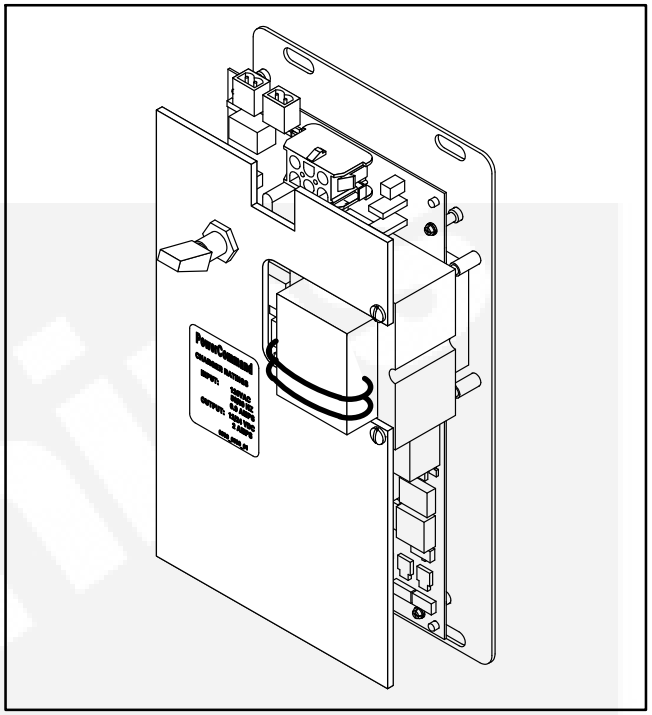


FIGURE 3-11. 2-AMP POWERCOMMAND BATTERY CHARGER

Control Panel

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

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

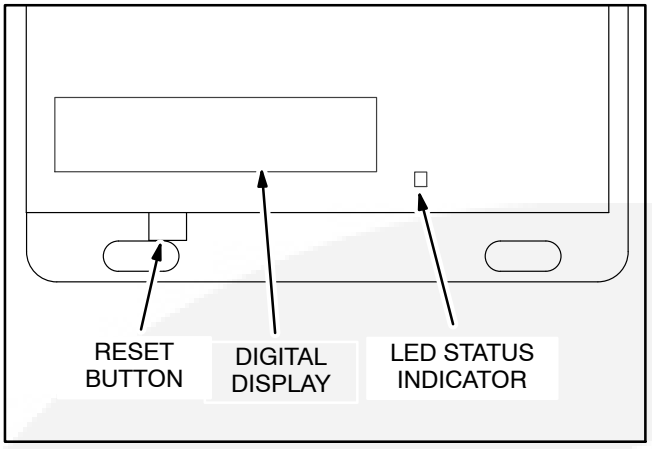


FIGURE 3-12. 2-AMP CHARGER CONTROL PANEL

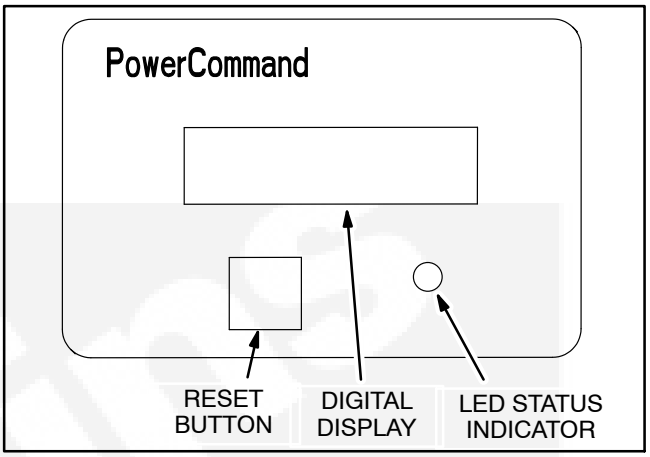


FIGURE 3-13. 15/12-AMP CHARGER CONTROL PANEL

Battery Charger Configuration

The **RESET** button on the control panel (see Figure 3-12) is used to configure the battery charger for the correct battery voltage. (More information on Setup menus is included in the Battery Charger Operator's Manual (901–0106).)

15/12-Amp Battery Charger

There are two types of 15/12-amp PowerCommand battery chargers (see Figure 3-14). All 15/12-amp battery chargers have a 20 amp DC circuit breaker switch on the front of the battery charger. The 120, 208, and 240 VAC battery chargers include two 10 amp AC circuit breaker switches and a circuit breaker guard, while the 277, 380, 416, and 600 VAC battery chargers include two AC fuse holders.

Control Panel

The 15/12-amp charger control panel includes a digital display, a Reset button, and an LED status indicator (see Figure 3-13).

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

Optional Battery Temperature Sensor

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

Battery Charger Configuration

The **RESET** button on the control panel (see Figure 3-13) is used to configure the battery charger. (More information on Setup menus is included in the Battery Charger Operator's Manual (901–0107).)

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

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

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

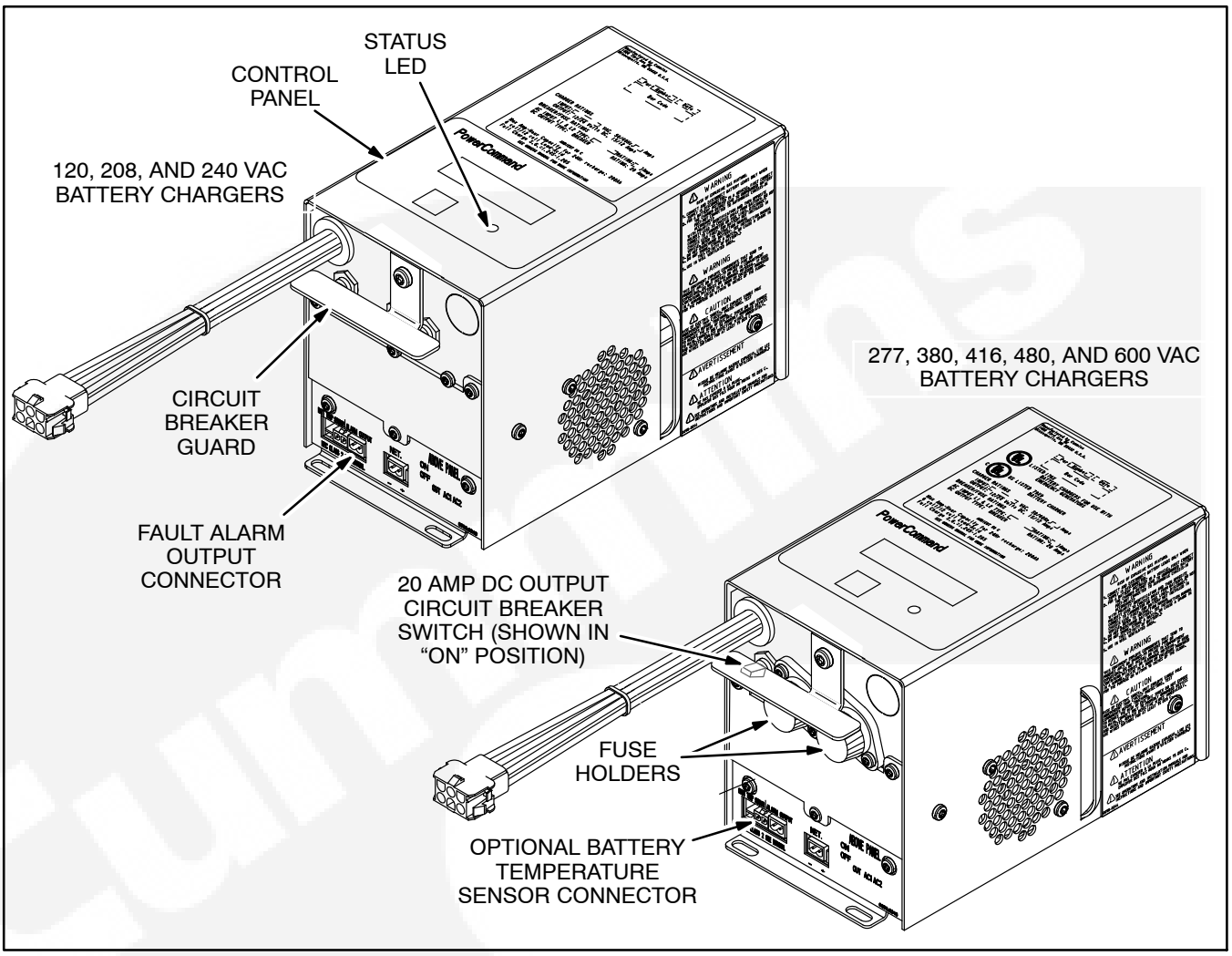


FIGURE 3-14. 15/12-AMP POWERCOMMAND BATTERY CHARGERS

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 mounted on the relay mounting panel (see Figure 3-15).

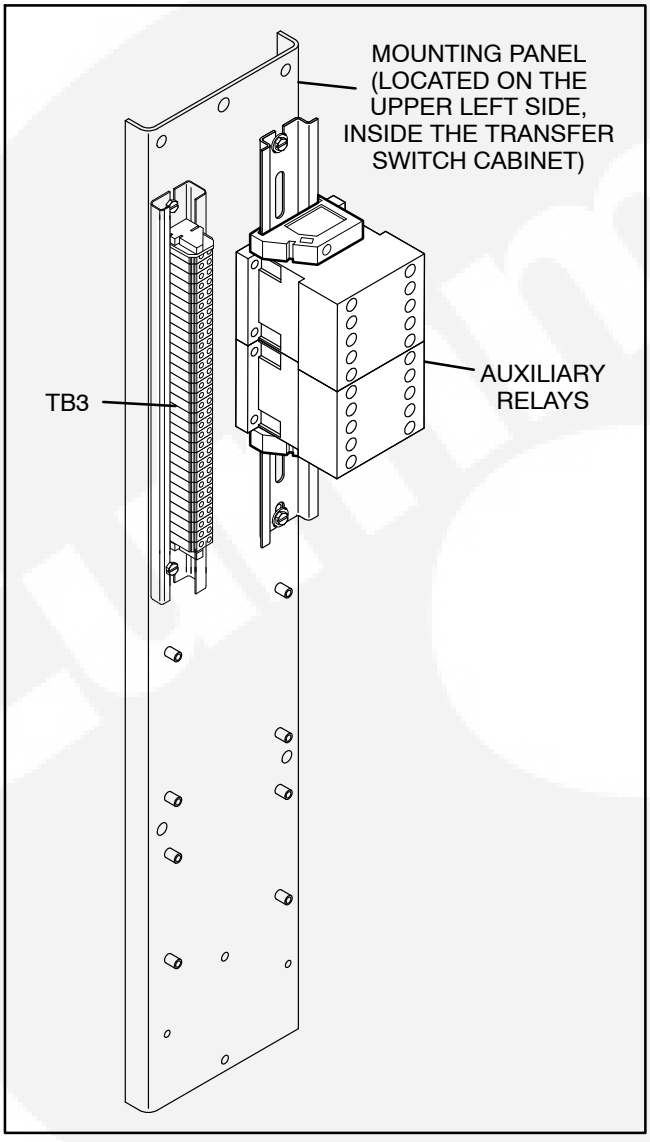


FIGURE 3-15. CONTROL WIRING CONNECTIONS

Terminal Block (30 Position) Option

An optional 30-position terminal block (see Figure 3-15) is available for customer connections. The terminal bock (TB3) is mounted on the relay plate (see Figures 3-1 through 3-4).

Elevator Signal Relay Option

The transfer switch may include an elevator signal relay (see Figure 3-16). This relay provides an output contact for the signal relay function. The elevator signal relay is mounted on the relay mounting panel. Additional information on the elevator signal feature is include on page 4-2.

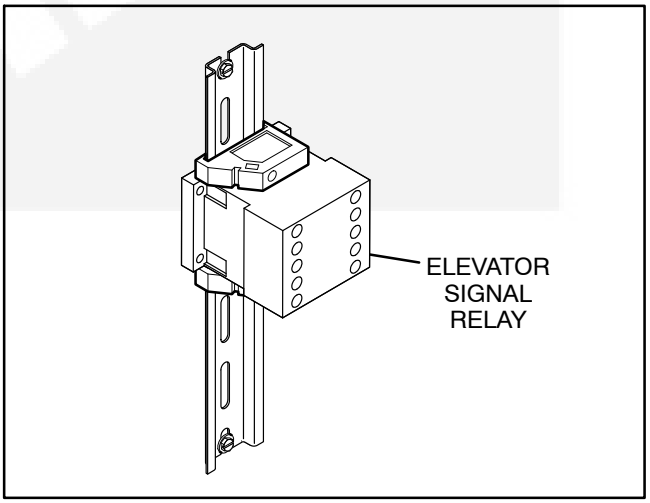


FIGURE 3-16. ELEVATOR SIGNAL RELAY

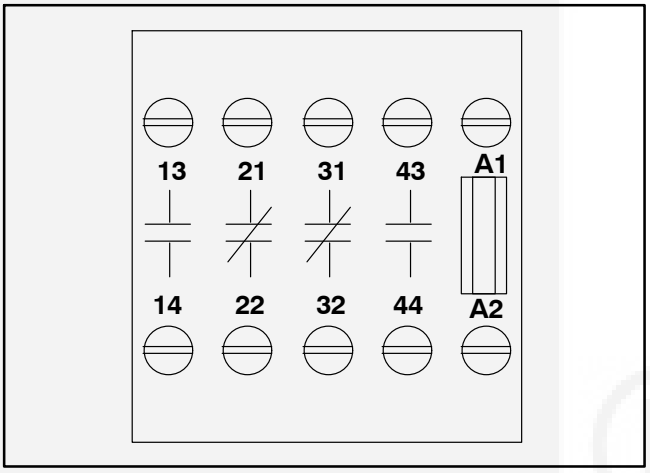


FIGURE 3-17. RELAY TERMINALS

External Exercise Clock Option (0307–3053)

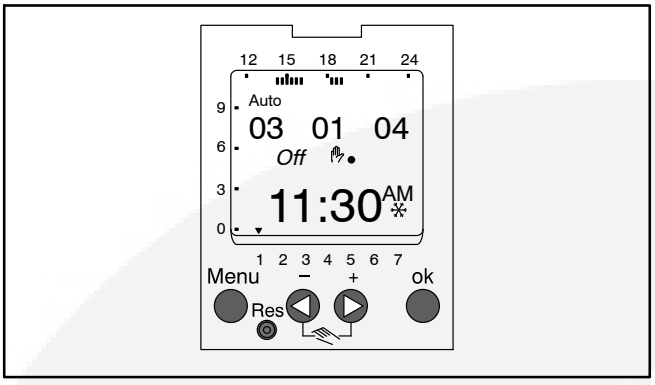


FIGURE 3-18. EXTERNAL EXERCISE CLOCK

The optional external exercise clock includes a real-time clock that keeps track of the time and date. The 7-day clock can be set for automatic changeover for summer/winter (Daylight Savings/ Standard) time. The exercise clock can be used with 12 or 24 VDC operation.

Up to 28 programs are available to set exercise start and stop times. One program is required to start an exercise period and a second one is required to stop an exercise period.

The exercise clock has a built-in test feature that can be used to initiate an exercise that hasn't been programmed or cancel a programmed exercise in process.

Information on setting the clock is included in *Section 4*.

NOTE: The clock includes a non-replaceable lithium battery with a life expectancy of at least ten years. If the clock battery is weak during a power failure, the clock will need to be replaced.

Generator Set Starting Battery Relay Options

The transfer switch may include three 12 or 24V starting battery relays. The relays are located on the relay plate (see Figure 3-19).

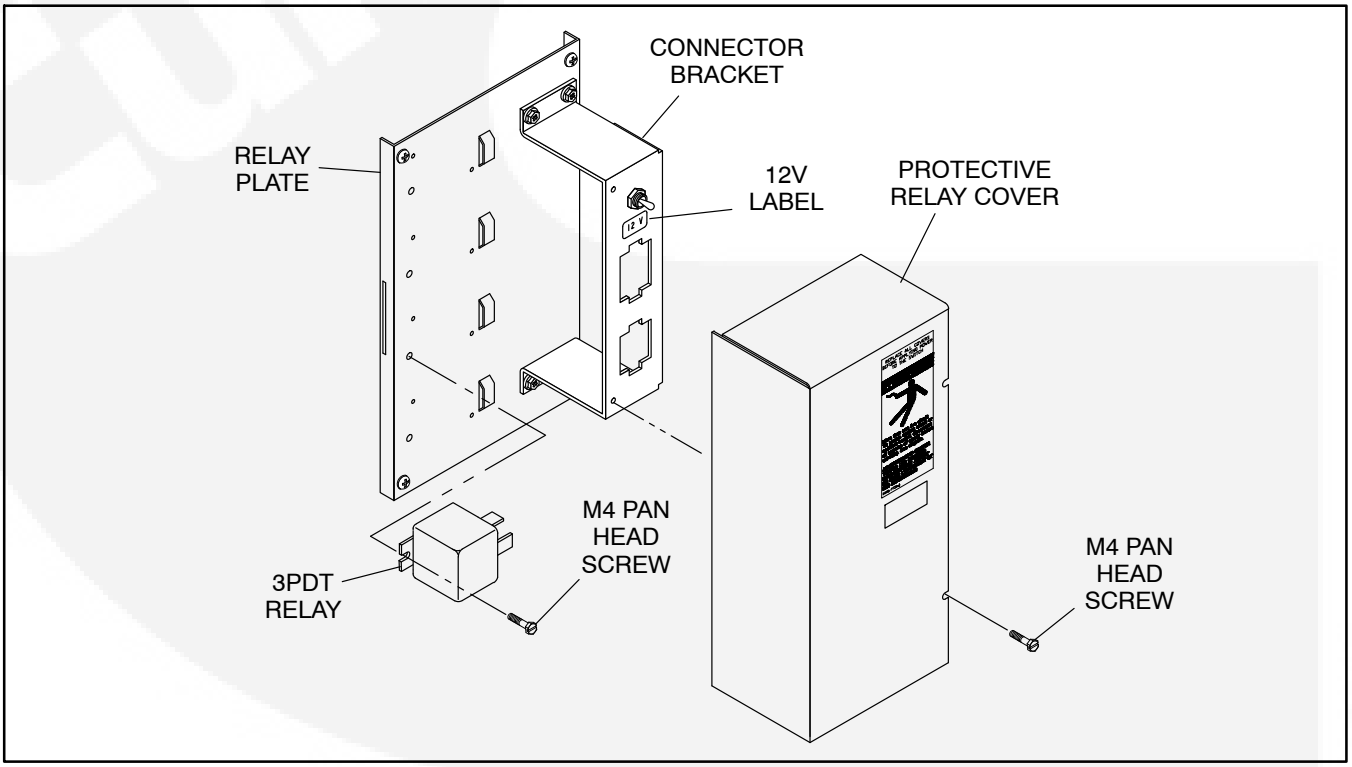


FIGURE 3-19. VOLTAGE CONVERSION RELAYS FOR OTECSE TRANSFER SWITCHES

Control Cover Guard Option

The transfer switch may include a cover guard for the control (see Figure 3-20). It includes a key which, when removed, prevents unauthorized personnel from using the control panel.

FIGURE 3-20. INSTALLED CONTROL PANEL COVER GUARD

Remote Override Input

The transfer switch may be wired with a remote Override Switch that functions the same as the control panel Override pushbutton.

A remote override input is set up by connecting a dry (voltage free) contact between P4-2 on the back of the control panel and TB2-8 (see Figure 3-21). Closing the contact enables the feature and opening the contact disables it.

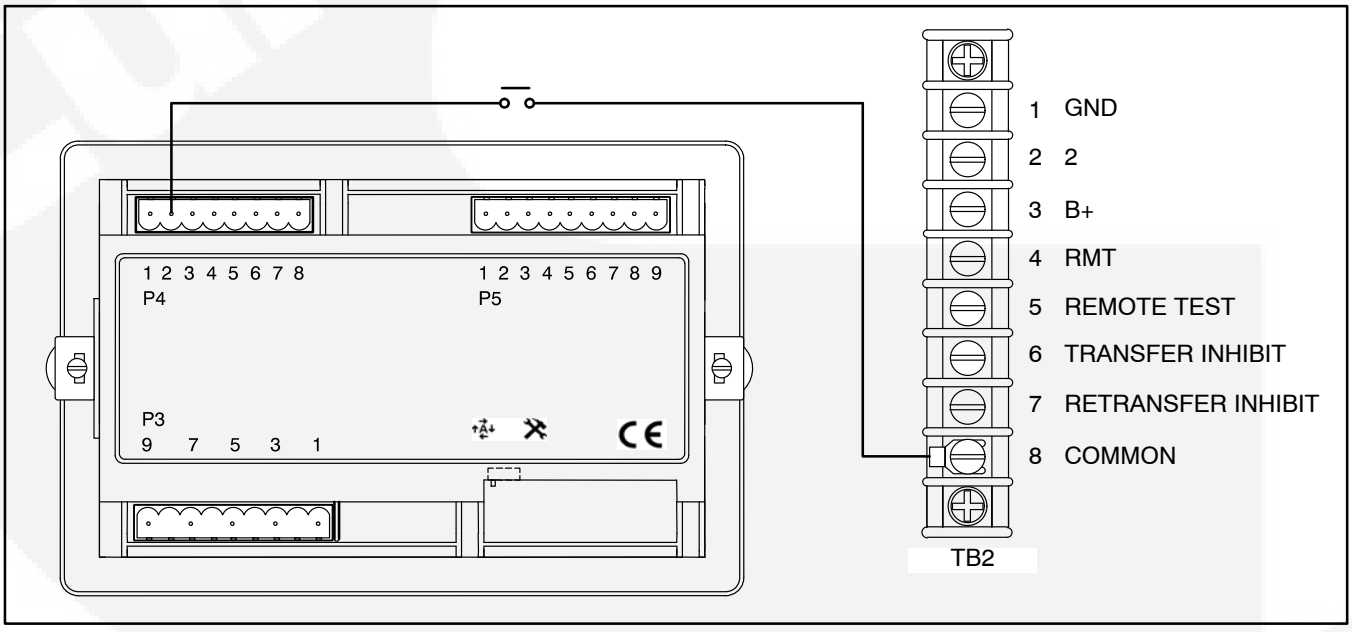


FIGURE 3-21. CONNECTIONS FOR REMOTE OVERRIDE INPUT

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4. Operation

TIME DELAYS

The transfer switch control uses various time delays to break from one power source and reconnect to the other source. The control panel can be used to adjust these time delays (see *Section 5*).

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

- When the transfer switch is connected to Normal, it is connected to the utility power source.
- When the transfer switch is connected to Emergency, it is connected to the generator set power source.
- When the transfer switch is in the Neutral position, it is not connected to either power source.

Time Delay Engine Start (TDES)

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

When the control senses a utility failure, the control starts the Time Delay Engine Start (TDES) timer. This time delay is configurable for 0 (disabled), 0.5, 1, 2, 3, 4, 6, or 10 seconds (default = 3 seconds).

If utility power returns while the TDES timer is active, the timer is reset. When the timer expires, the control de-energizes the start relay, closing the start contact signalling the generator to start. The timer is not reset until utility power returns. If the Override pushbutton is pressed or the Override input is grounded while the TDES timer is active, the TDES timer immediately expires.

Time Delay Engine Cooldown (TDEC)

This time delay allows the generator to cool down (under no load conditions) before the control turns it off.

The Time Delay Engine Cooldown (TDEC) starts timing when the load is retransferred to utility power. This time delay is configurable for 0 (disabled), 0.1, 5, 10, 15, 20, 25 or 30 minutes (default = 10 minutes).

When the TDES expires, the stop signal is sent to the generator and the timer is reset. Pressing the Override pushbutton or grounding the Override input has no effect on this time delay.

Time Delay Normal to Emergency (TDNE)

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

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

The time delay is configurable for 0 (disabled), 1, 2, 3, 5, 30, 120, or 300 seconds (default = 5 seconds). If the generator fails any time during a TDNE, the control resets the timer and restarts it once the generator is again available.

If the Override pushbutton is pressed or the Override input is grounded while the TDNE timer is active, the TDNE timer immediately expires. The TDNE timer will not begin if a Transfer Inhibit input is active.

Time Delay Emergency to Normal (TDEN)

While connected to Emergency, this time delay allows utility power to stabilize before the retransfer command is issued. This delay also allows the generator to operate under load for a minimum amount of time before transferring back to utility power.

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

The time delay is configurable for 0 (disabled), 0.1, 5, 10, 15, 20, 25 or 30 minutes (default = 10 minutes). If the utility fails any time during this time delay, the control resets the timer and restarts it once utility power becomes available. If the generator fails at any time during this time delay, the timer expires and the normal retransfer sequence takes place.

If the Override pushbutton is pressed or the Override input is grounded while the TDEN timer is ac-

tive, the TDEN timer immediately expires. The TDEN timer will not begin if a Retransfer Inhibit input is active.

Time Delay Programmed Transition (TDPT)

This feature causes the transfer switch to pause in the Neutral position for an adjustable period of time whenever there is a transfer from one source to another. The intentional delay allows the residual voltage of an inductive load to sufficiently decay before connecting it to another power source. This delay prevents potentially damaging voltage and current transients in the customer's power system. If TDPT is set to zero, then the transfer switch transfers from one source to the other with no neutral position delay.

The control activates a Program Transition Time Delay (TDPT) whenever the transfer switch has disconnected from one source and is in the Neutral position. The time delay is configurable for 0 (disabled), 0.5, 1, 2, 3, 4, 6 or 10 seconds (default = 0 seconds). The control also detects if the transfer switch has disconnected from the first source before connecting it to the second source.

If there is a power source failure while the TDPT is active, the control only transfers to the remaining active power source. The control does not terminate the TDPT timer if either source fails while the transfer switch is in the Neutral position.

Time Delay Elevator (TDEL) Pre-Transfer

Primarily 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 elevator pre-transfer signal and associated time delay, is used to signal an elevator control system that there is an impending transfer or retransfer (i.e., the elevator is going to see a brief power failure).

This delay is disabled during an actual source failure. If the timer is set for more than 0 seconds, then the control activates the elevator pre-transfer output and time delay prior to transferring the transfer switch between two live sources. If the control is in a Test or Exercise sequence, the control adds an additional delay prior to activating the transfer and retransfer commands. After the TDNE (and/or TDEN) time delay expires, the control activates the Elevator output and starts the TDEL timer.

The output relay has two normally open and two normally closed contacts, rated 10 amps at 600 volts.

When the timer expires, the control issues the transfer (or retransfer) command. When the timer is inactive or expires, the control deactivates the relay output.

The Elevator Pre-transfer Time Delay is configurable for 0 (disabled), 1, 2, 3, 5, 30, 120, or 300 seconds (default = 0 seconds).

Transfer Inhibit and Retransfer Inhibit do NOT affect or delay the elevator pre-transfer delay while it is active.

The Override pushbutton or Override input has no effect on this time delay.

The OTECSE control also includes a feature called Elevator Post Transfer Delay that keeps the elevator output active for the same TDEL time period after the transfer switch transfers. For more information, see "Elevator Post Transfer Delay" below.

Elevator Post Transfer Delay

The Elevator Post Transfer Delay feature keeps the elevator output active for the same TDEL time period after the transfer switch transfers. Instead of deactivating the elevator output when the pre-transfer time delay expires, the control keeps the output active and starts the TDEL timer again after it senses that the transfer switch has transferred. When the TDEL timer expires the second time, the control deactivates the elevator output. The Elevator Post Transfer Delay is configurable to be enabled (On) or disabled (Off) (default = Off).

MANUAL OPERATION

The transfer switch has operator handles for manually transferring the load (see Figure 4-1). Manual operation must be performed by qualified personnel under **NO-LOAD CONDITIONS ONLY**. Use the following procedure:

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

1. Verify that the generator switch is in the OFF position.

2. Verify that the transfer switch is not under load.

3. For Type 3R and 12 cabinets, open the transfer switch outer door.

4. Move the circuit breaker handle to the Off position.

NOTE: The circuit breakers include a trip button which can be pressed instead of moving the handle to the Off position.

5. Remove power to the control by disconnecting the J1 connector (see Figures 3-1 through 3-4).

6. **Transfer - from the utility (Normal) to the generator set (Emergency):**

   a. Pull the upper manual operator handle down.

   b. Push the lower manual operator handle down.

   Retransfer - from the generator set (Emergency) to the utility (Normal):

   a. Pull the lower manual operator handle up.

   b. Push the upper manual operator handle up.

NOTE: Remember that the transfer switch transfers the load to the active power source. (If both power sources are available, it transfers the load to the utility.)

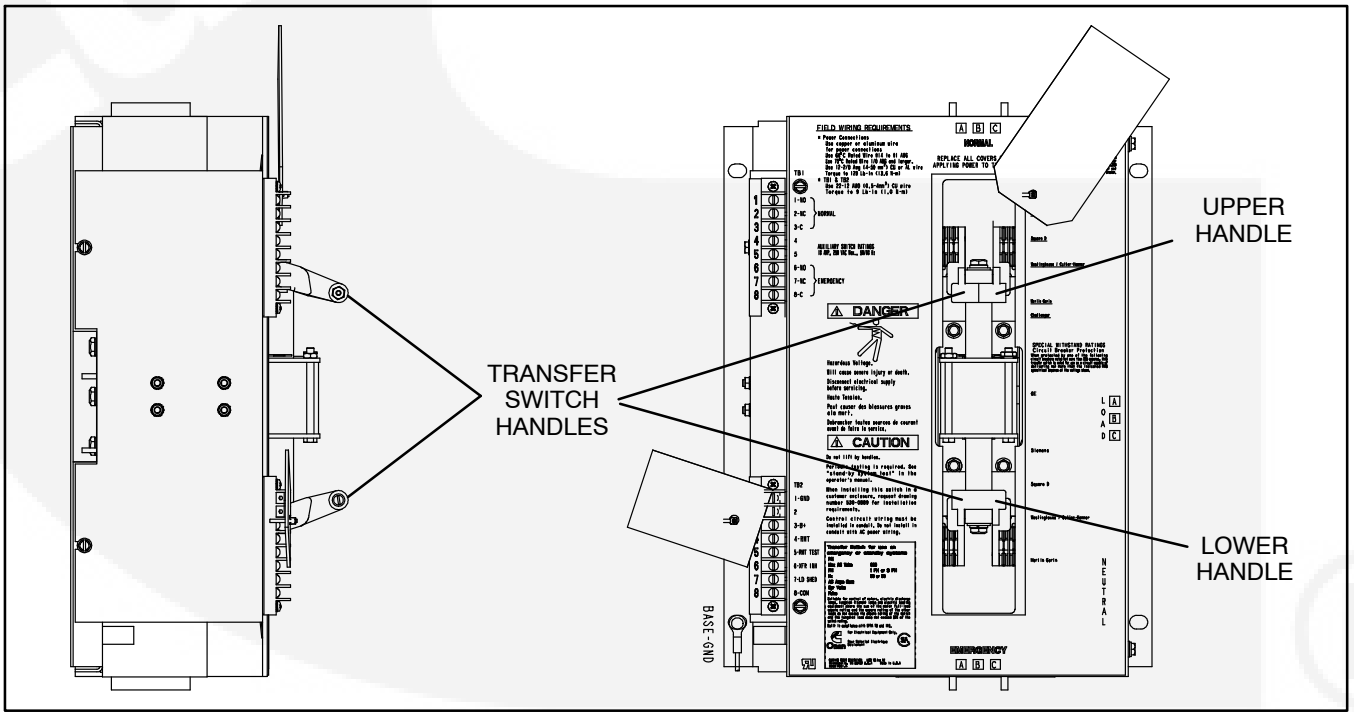


FIGURE 4-1. MANUAL OPERATION HANDLES

⚠WARNING ***Automatic transfer switch operation results in rapid movement of the manual operator handles and presents a hazard of severe personal injury. Keep hands clear of handles when switching back to automatic operation.***

7. To return to automatic operation, restore power to the control by reconnecting the J1 connector.

8. Move the circuit breaker handle to the On position.

   NOTE: If the trip button was pressed in step 4, the circuit breaker handle must first be moved to the Off position and then moved to the On position.

9. For Type 3R and 12 cabinets, close the cabinet outer door.

PUSHBUTTON OPERATION

The following describes operation of the three pushbuttons located on the control panel.

Test Pushbutton

The Test pushbutton is used to:

- Start a generator set test. The Exercise LED flashes if the Test pushbutton is pressed and held for two seconds.
- Terminate a generator set test. The Exercise LED goes out if the Test pushbutton is momentarily pressed.

More information on testing is included on the following pages.

Override Pushbutton

The Override pushbutton is used to:

- Terminate the following system time delays:
  - Time Delay Engine Start (TDES)
  - Time Delay Normal to Emergency (TDNE)
  - Time Delay Emergency to Normal (TDEN)
- Bypass the TDNE timer and transfer the load immediately during an active Transfer Inhibit input.
- Bypass the TDEN timer and retransfer the load immediately during an active Retransfer Inhibit input.
- Stop the Utility Power Connected LED from flashing as a result of a failure to connect to or disconnect from the utility when commanded.
- Stop the Genset Power Connected LED from flashing as a result of a failure to connect to or disconnect from the generator set when commanded.
- Cancel an active exercise period.

The Program Transition (TDPT), Elevator signal (TDEL), and Engine Cool Down (TDEC) time delays are not affected by pressing this pushbutton.

Set Exercise Pushbutton

This pushbutton is only used with the integrated exerciser and only functions if the External Exercise function is disabled (set to Off). Information on configuring the control panel is included in *Section 5*.

The Set Exercise pushbutton is used to:

- Set a delayed repeat exercise period when the pushbutton is pressed and held for five seconds.
- Start an immediate exercise period (that also repeats) if the pushbutton is pressed momentarily within ten seconds of starting the delayed exercise period.
- Cancel a repeatable exercise period if the pushbutton is pressed and held for five seconds.

More information on using the integrated exerciser is included on page NO TAG.

TEST WITH OR WITHOUT LOAD

This feature allows a transfer switch operator to test the transfer switch and generator power system. The test is configurable to be with load or without load. A test with load initiates a load transfer. A test without load just starts the generator and runs it without load.

1. Verify that the transfer switch is set to test with or without load, as desired (see *Section 5*).
2. To start a test, press and hold the Test Pushbutton for two seconds or ground the Remote Test input.
3. To end the test, momentarily press the Test pushbutton or remove the ground from the Remote Test input.

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

Test With Load Sequence of Events

The following describes the sequence of events of an OTECSE transfer switch during a test with load. In this example, TDPT is set to zero, the phase check sensor is disabled, the Transfer Inhibit and Retransfer Inhibit inputs are inactive, and TDEL is set to zero.

The utility must be acceptable during the entire test event. Acceptability is determined by the active source sensor (undervoltage sensor). If, at any time, the undervoltage sensor determines that the utility is not acceptable, the Test is terminated.

Before a test can begin, the transfer switch must be connected to the utility power source and utility power must be available.

1. Verify that the transfer switch is set to test with load.
2. Verify that the green Utility Power Connected LED on the control panel is lit.
3. Verify that the green Utility Power Available LED on the control panel is lit.
4. Press and hold the control panel Test pushbutton for two seconds or ground the Remote Test input to initiate the Test. The Test LED flashes two times per second for two seconds, acknowledging that the test was activated. Once the test period starts, the Test LED stays on continuously.
5. The control simulates a utility power failure but the Utility Power Available LED remains lit as long as the utility is still available.
6. The control starts the TDES timer. After the timer expires, the control de-energizes the start relay, closing the start contact to signal the generator to start.
7. When the generator output is acceptable (the Genset Power Available LED is lit) the control starts the TDNE timer.
8. After the TDNE timer expires, the transfer switch transfers to the generator set (the Genset Power Connected LED is lit).
9. The control continues to run the generator with the transfer switch connected to the generator set until the control panel Test pushbutton is momentarily pressed or the ground is removed from the Remote Test input.
10. After this action, the control starts the TDEN timer. The Test LED flashes twice per second for two seconds to acknowledge the operation and then the Test LED goes out.
11. After the TDEN timer expires, the transfer switch retransfers back to the utility (the Utility Power Connected LED is lit).
12. Once the transfer switch is connected to utility power, the control starts the TDEC timer.
13. After the timer expires, the control energizes the start relay, opening the start contact to signal the generator to stop.

Test Without Load Sequence of Events

The following describes the sequence of events of an OTECSE transfer switch during a test without load. In this sequence of events, the generator is started and runs without load for the duration of the test.

The utility must be acceptable during the entire test event. Acceptability is determined by the active source sensor (undervoltage sensor). If, at any time, the undervoltage sensor determines that the utility is not acceptable, the Test is terminated.

Before a test can begin, the transfer switch must be connected to the utility and utility power must be available.

1. Verify that the transfer switch is set to test without load.

2. Verify that the green Utility Power Connected LED on the control panel is lit.

3. Verify that the green Utility Power Available LED on the control panel is lit.

4. Press and hold the control panel Test pushbutton for two seconds or ground the Remote Test input. The Test LED flashes twice per second for two seconds acknowledging that the test was activated. Once the test period starts, the Test LED stays on continuously.

5. The control de-energizes the start relay, closing the start contact to signal the generator to start. When the generator set starts and produces power, the amber Genset Power Available LED lights.

6. The control continues to run the generator without load until the control panel Test pushbutton is momentarily pressed or the ground is removed from the Remote Test input.

7. After the control panel Test pushbutton is momentarily pressed or the ground is removed from the Remote Test input, the control flashes the Test LED twice per second for two seconds to acknowledge the operation and then goes out.

8. The control energizes the start relay, opening the start contact to signal the generator to stop.

SENSORS

Utility Sensor

The utility sensor monitors all phases of the utility for undervoltage conditions. Both the pickup and dropout set points are adjustable. The set points are listed in Table 4-1. Refer to *Section 5* for information on how to make adjustments.

TABLE 4-1. UTILITY UNDERVOLTAGE SET POINTS

Description	Available Set Points
Undervoltage Pickup (% of Nominal)	95%
	90%
Undervoltage Dropout (% of Nominal)	90%
	85%
	80%
	70%

NOTE: If the utility undervoltage pickup is set at 90%, then the dropout has to be set lower than 90%.

Figure 4-2 illustrates how the pickup and dropout settings work.

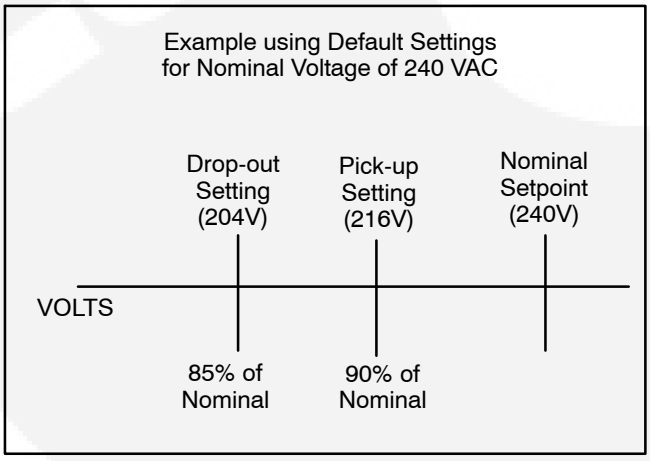


FIGURE 4-2. UNDERVOLTAGE SENSING

Generator Sensor

The generator sensor is a single phase sensor that monitors undervoltage and underfrequency conditions. All the pickup and dropout settings are fixed and are not adjustable. The generator set undervoltage and underfrequency set points are listed in Table 4-2.

TABLE 4-2. GENERATOR SET UNDERVOLTAGE AND UNDERFREQUENCY SET POINTS

Description	Set Point
Undervoltage Pickup (% of Nominal)	90%
Undervoltage Dropout (% of Nominal)	75%
Underfrequency Pickup (% of Nominal)	90%
Underfrequency Dropout (% of Nominal)	85%

Phase Check Sensor

The phase check sensor can be enabled (set to On) for applications that require a fast transfer of a load between two live sources (both power source available LEDs are lit). The phase check sensor determines when the relative phase difference (less than 25 degrees and approaching 0) and the frequency difference (less than 1 Hz) of the two sources are within specified limits. When all conditions are met, a transfer is initiated. If enabled, the phase check sensor is activated after all time delays have expired, just before the transfer switch transfers the load, and only when both sources are available. Information on configuring the Phase Check On/Off function is included in *Section 5*.

Return to Programmed Transition

This feature can be used in conjunction with the phase check sensor. If, for some reason the two sources do not fall within the specified limits of the phase check sensor for a period of two minutes, then the control bypasses the phase check sensor, returns to the Programmed Transition sequence of operation, and transfers the load. If this feature is enabled, the programmed transition time delay (TDPT) should be set greater than zero. The actual setting depends on your load.

GENERATOR SET EXERCISER

There are two exercise clock options, A049B864 and 0307–3053. Please refer to the appropriate section for further details on your model: Section 4–10 for A049B864 and Section 4–27 for 0307–3053.

General Information

Run the generator at least 30 minutes once each week with at least 50 percent load (if possible). If you do not want to use the exerciser, use the Test switch, to test the generator set each week. The control includes an integrated exerciser that is set by pressing the Set Exercise pushbutton. In addition, there may also be an optional fully programmable external exerciser clock installed and wired to a control input.
If both types of exercisers are available, only one exerciser can operate at a time. The control panel must be configured for the type of exerciser being used. This is done by setting the External Exerciser function On or Off.

- If the **integrated exerciser is used**, the External Exercise On/Off function must be set to Off.

- If the **external exerciser is used**, the External Exercise On/Off function must be set to On.

- If the **external exerciser is factory–supplied**, the External Exercise On/Off function is set to On at the factory.

- If the **external exerciser is not factory installed**, the External Exercise On/Off function is set to Off.

Exercise With or Without Load

The exercise with/without load configuration works with both types of exercisers (default = without load) – see *Section 5*. When “With Load” is selected, the load is transferred to the generator set. When “Without Load” is selected, the generator set runs with no load for the duration of the exercise period.

Integrated Exerciser

This function is standard and is built into the control. With this exerciser, the exercise period is 20 minutes and it repeats every 7, 14, 21, or 28 days (default = 7 days) – see *Section 5*.

The integrated exercise function cannot be used unless the External Exercise function is disabled (set to Off).

Before an exercise can begin, the transfer switch must be connected to utility power and utility power must be available (the green Utility Power Available LED must be lit).

Power Loss Backup

If DC power is removed from the control panel, the exercise clock uses a replaceable lithium battery (Cummins Power Generation part number 416–1250) to back up the time setting. The battery is good for ten years and doesn’t need to be serviced. The battery is attached to the time chip on the control board.

If no exercise period is set, the Exercise LED is off (see Figure 3-5).

Setting the Integrated Exercise Period

1. Verify that the Exercise LED is off and the External Exercise function is disabled (set to Off – see *Section 5*). If the External Exercise function is enabled, the integral exerciser is disabled.

2. To set the exercise start time for a **repeat exercise period**, press and hold the Set Exercise pushbutton for 5 seconds. The Exercise LED flashes at a rate of twice per second for 5 seconds and then stays on when the exercise period is set. A delayed 20 minute exercise period will start in 12 hours. At that time, the Exercise LED flashes at a rate of once per second during the entire exercise period. When the exercise period is over, the Exercise LED quits flashing and remains on to signify that repeat exercise periods are enabled.

3. To start an **immediate exercise period** and have it repeat, momentarily press the Set Exercise pushbutton a second time within ten seconds of starting the delayed exercise period. Momentarily pressing and releasing the Set Exercise pushbutton a second time starts an immediate 20 minute exercise period instead of waiting for 12 hours. The Exercise LED flashes at a rate of once per second during the entire exercise period. When the exercise period is over, the Exercise LED stops flashing and remains on to signify that repeat exercise periods are enabled.

Canceling Repeat Exercise Periods

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

Canceling An Active Exercise Period

Active exercise periods can be canceled by pressing the Override pushbutton on the control panel or by grounding the remote override input (P4-2) on the back of the control panel.

Power Source Failure During An Active Exercise Period

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

Exercise Without Load Sequence of Events

1. When an exercise period becomes active, the Exerciser LED flashes at a rate of once per second.
2. The control signals the generator to start and run for 20 minutes.
3. After the exercise period has ended, the control signals the generator to stop.
4. The Exercise LED stops flashing and remains on to signify that repeat exercise periods are set (unless there are no repeat exercise periods). If there are no repeat exercise periods, the Exercise LED goes out.

Exercise With Load Sequence of Events

1. When an exercise period becomes active, the Exerciser LED flashes at a rate of once per second.
2. The control signals the generator to start.
3. When the generator output is acceptable, the control transfers the load to the generator, following the configuration set points.
4. After the exercise period has ended, the control retransfers the load back to the utility, following the configured set points.
5. Once the load is connected to utility power, the control runs the generator set unload for the duration of the cooldown timer (TDEC).
6. After the TDEC timer expires, the control signals the generator set to stop.
7. Unless the repeat exercise periods have been canceled, the Exercise LED quits flashing and remains on to signify that repeat exercise periods are set. If the exerciser is not set up to repeat exercises, the Exercise LED goes out.

EXTERNAL EXERCISE CLOCK OPTION [TR 610 TOP2] (P/N A049B864)

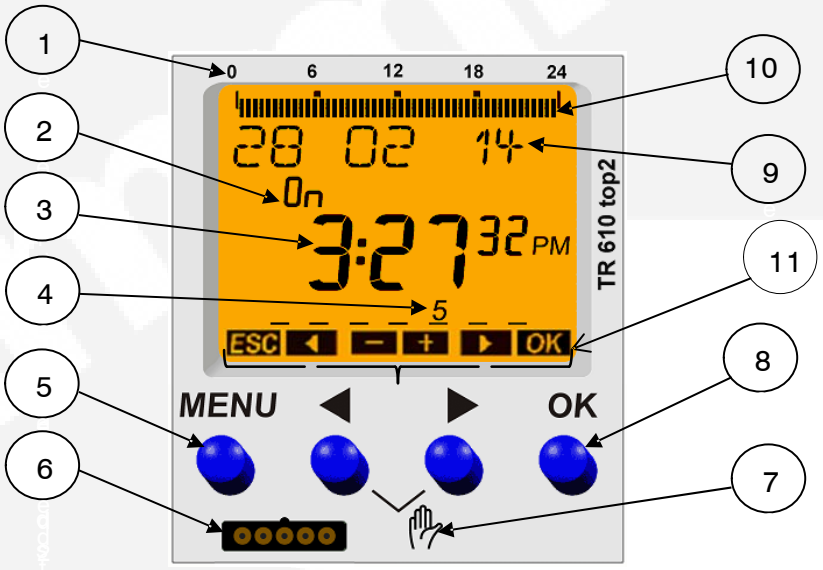
The optional external exercise clock includes a real–time clock that keeps track of the time and date. The 7–DAY clock can be set for automatic changeover for summer/winter (daylight savings/ standard) time. The exercise clock can be used with 120V AC, 230–240V AC or 12–24 V AC or DC +10%/–15% operation.

Up to 56 programs are available to set exercise start and stop times. One program is required to start an exercise period and a second one is required to stop an exercise period.

The exercise clock has a built–in test feature that can be used to initiate an exercise that has not been programmed or cancel a programmed exercise in process.

NOTE: The clock includes a non–replaceable lithium battery with a life expectancy of at least ten years power reserved is reduced with memory card inserted (in battery mode). If the clock battery is weak during a power failure, the clock will need to be replaced.

FIGURE 13.1 EXTERNAL EXERCISE CLOCK



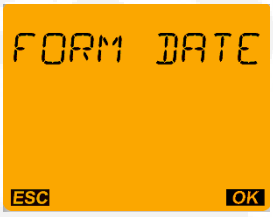
No.	Description	No.	Description
1	Time of DAY indicators	7	-/+ push buttons Used to increase/decrease values, to scroll through menus and to select special functions.
2	Exercise state indicator (On/Off)	8	OK button Used to confirm selection
3	Time of DAY	9	DATE (DAY, MONTH and YEAR)
4	DAY of week indicator (1 = MONDAY, 7 = Sunday)	10	Indicators of when exercises are scheduled for the current DAY.
5	Menu selection push button Used to select one of four display modes or to abort adjusting parameters	11	Dynamic display of the push button
6	Obelisk Top2 Memory card slot		

INITIAL START–UP

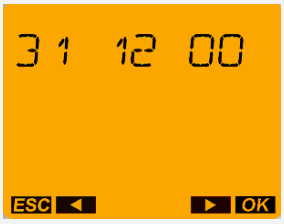
When the time switch is removed from the packaging all important settings have already been made. Individual settings can be performed by selecting and confirming.

1. The national language is being displayed, use the – or + push buttons to scroll through the available languages (English, Espanol, Francais, Portugal, Italiano or Deutsch).

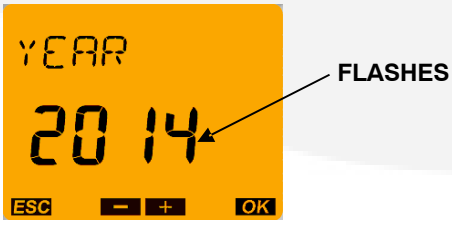
2. When the desired language is displayed, press the OK push button. The FORM DATE is displayed.



3. Press OK push button to display the DATE Formats.

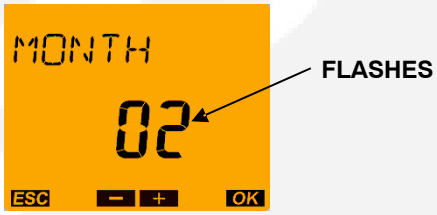


4. Press – or + push buttons to select the desired date Format, then press the OK push button. The YEAR is displayed.

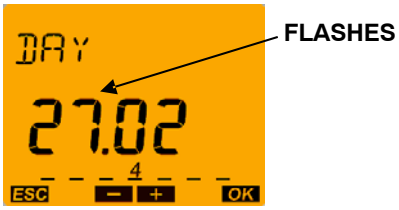


NOTE: By pressing the ESC push button, i.e. the menu button, it is possible to return to the previous setting menu. For example, if the user had made a mistake and pressed the OK button too quickly, the menu button enables returning to the previous selection item.

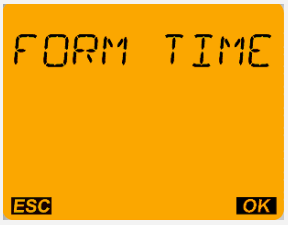
5. Press the – or + push buttons until the correct year is displayed and then press the OK push button. The MONTH is displayed.



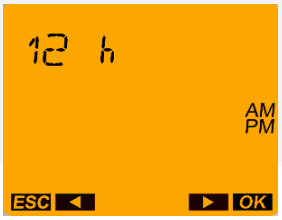
6. Press the – or + push buttons until the correct month is displayed and then press the OK button. The screen then shows the DAY value flashing.



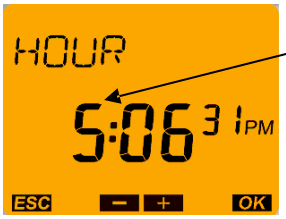
7. Press the – or + push buttons until the correct DAY is displayed and then press the OK push Button. The screen then shows the FORM TIME menu.



8. Press the OK push button. Press – or + push buttons to select the desired Time Format.



9. Press the OK push button when the desired Time format is displayed. The screen then shows the HOUR value flashing.



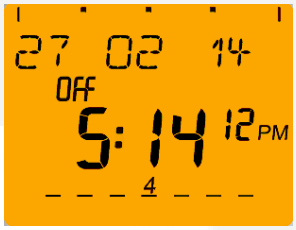
FLASHES

10. Press the – or + push buttons until the correct HOUR is displayed. Press the OK push button. The screen then shows the MINUTE value-flashing.

FLASHES

11. Press the – or + push buttons until the correct minute is displayed. Press the OK push button. The screen
then shows the automatic summer/winter (SU––WI USA) time changeover flashing.

12. Press the – or + push buttons until the correct Summer/winter time changeover is displayed. Press the OK
push button. The time switch is now in Auto mode and screen displays the correct date and time.



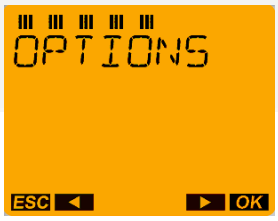
LCD LIGHTING (DISPLAY BACK LIGHT)

The LCD light (Display Back light) can be set to ”Always On” or ”Off after 1 Minute”.

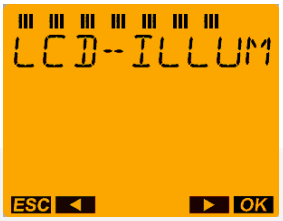
*ALWAYS ON = background lighting is never switched off
*OFF AFTER 1 MINUTE the background lighting is switched off again 1 minute after the last time the pushbutton was pressed.

1. From the Home menu, press the Menu button. The PROGRAM menu is displayed.

2. Press the + push button three times. The OPTIONS menu is displayed.



3. Press the OK push button, then press +push button until LCD ILLUMINATION menu appears.

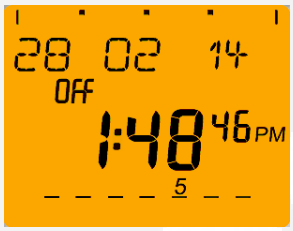


4. Press the OK push button to display the ALWAYS ON menu.

NOTE: With OK push button a return is made to LCD illumination.

5. Press – push button to display the ”AFTER 1 MINUTE OFF” menu.

6. Press the OK push button to return to LCD illumination menu. And then press Menu button twice to return to Home menu.



NOTE: In the battery mode (no mains) there is no LCD lighting

USING THE MENU BUTTON

The Menu selection button is used to select four display modes that have adjustable menus.

Time/DATE mode is used to set the correct DATE and time. This mode can also be used to automatically switch to the correct summer/winter time.

Program mode is used to set, review and clear exercise start/stop times.

Manual mode is used to Permanent On/Off, Override exercise. This mode can be also used to set holiday Program.

Options mode is used to enter a 4–digit code to prevent changing settings by unauthorized personnel. This mode can also be used to switch On/Off LCD–illumination (Display Back light)

When adjustments are completed, the Home menu (Auto mode) is redisplayed. The Menu button can also be used to abort adjusting parameters and return to the Home menu.

USING THE – / + PUSH BUTTONS

Pressing the – or + push buttons are used to:

–Increase or decrease a parameter in an adjustable menu
–Select the next or previous menu.

Simultaneously pressing the – and + push buttons is used to select special functions.

–Activate Manual Switching.
–Activate permanent switching.
–Cancelling manual/permanent switching.

USING THE 'OK' PUSH BUTTON

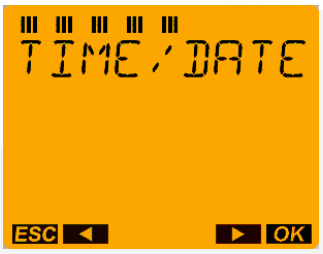
The OK push button is used to confirm the menu selection or program adjustments you have made. Upon pressing the OK push button, the next available menu is displayed and, if any program adjustments were made, the changes are saved.

SETTING THE TIME, DATE WITH SUMMER/ WINTER TIME (DAYLIGHT SAVINGS TIME)

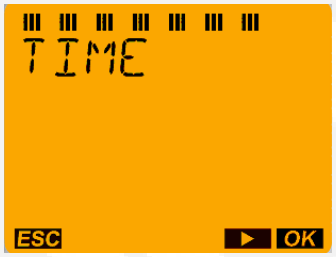
The clock is programmed with the correct DATE and central USA standard time and with the correct daylight savings time settings. If it is necessary to change these settings, the following describes how to adjust the time and DATE and how to set the clock to automatically switch to Summer/winter time (Daylight savings time).

1. Press the Menu push button on the exercise clock. The Program menu is displayed.

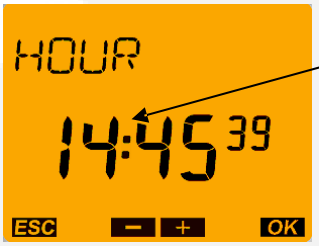
2. Press the + push button. The Time/DATE menu is displayed.



3. Press the OK push button to display the Time menu.



4. Press the OK push button to display the HOUR menu.

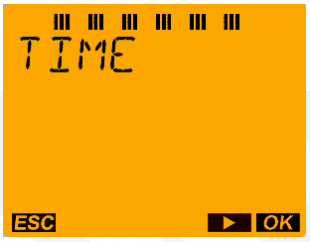


FLASHES

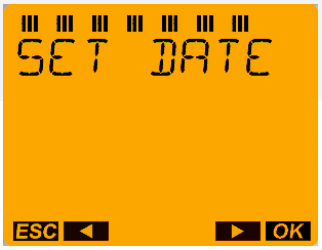
5. Press the – or + push buttons to set the correct hour. Press the OK push button to display the MINUTE menu.

FLASHES

6. Press the – or + push buttons to set the correct Minute. Press the OK push button to display the TIME menu.



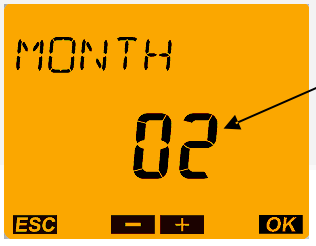
7. Press the + push button. The SET DATE menu is displayed.



8. Press the OK push button to display the YEAR menu.

FLASHES

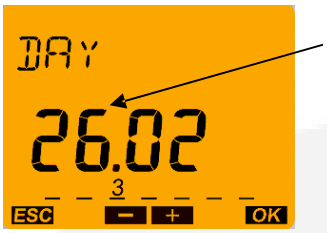
9. Press the – or +push button to set the correct YEAR. Press the OK push button to display the MONTH menu.



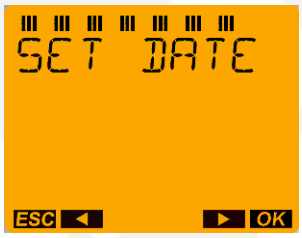
FLASHES

10. Press the – or + push buttons to set the correct

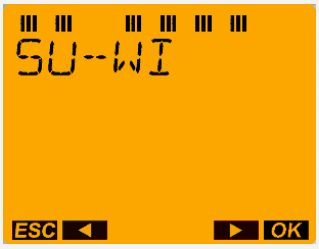
MONTH. Press the OK push button to display the DAY menu.



11. Press the – or + push buttons to set the correct DAY. Press the OK push button to display the SET DATE menu.



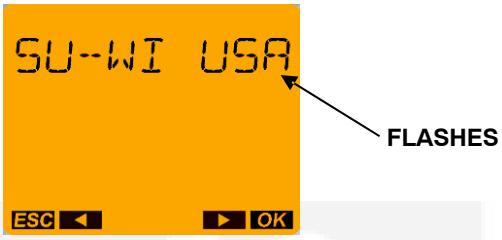
12. Press the + push button. The Summer/Winter (SU––WI) menu is displayed.



13. Press the OK push button to display the World Area menu.

It is possible to choose between 6 pre–set changeover settings, use own changeover settings with 2 different methods, or switch off the automatic summer/winter time changeover using – or + push buttons.

14. Press – or + push buttons to select one of the world areas that has been programmed for auto-



matic time correction or else set up your own changeover times. Then press OK push button to activate and return to SU–WI menu.

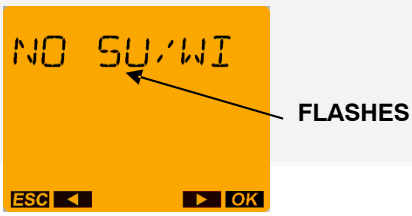
NOTE: With the DAY light Savings Time program set for North America,

* The first Sunday in April moves the time forward one hour.

* The last Sunday in October moves the time back one hour.

* If you wish to select one of the world areas (GB/IRL/P, FIN/GR/TR, CDN, USA, IRAN, EUROPE that has been programmed for automatic time correction, press the + or –push buttons until the correct world area is selected. Then press OK button to activate and return to SU–WI menu.

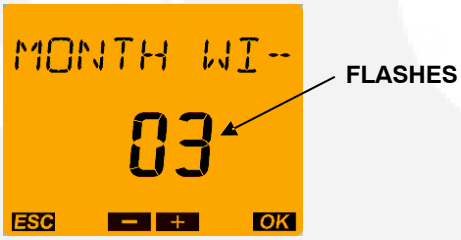
If you do not wish to set the clock for automatic summer/winter changeover, press the – or + push buttons. ”NO SU–WI” is displayed on the screen. Press the OK button to return to the SU–WI menu.



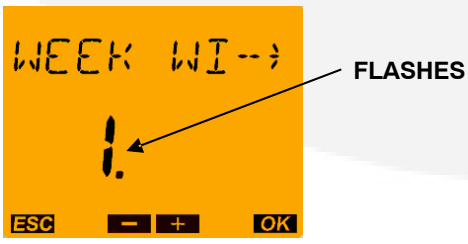
CODE	COUNTRY NAME
GB	GREAT BRITAIN
IRL	IRELAND
FIN	FINLAND
GR	GREECE
TR	TURKEY
CDN	CANADA
USA	UNITED STATES OF AMERICA
IRAN	IRAN
EUROPE	EUROPE

15. Press the – or + push buttons to display SU–WI FREE RULE, and press OK push button to set up your own changeover times.

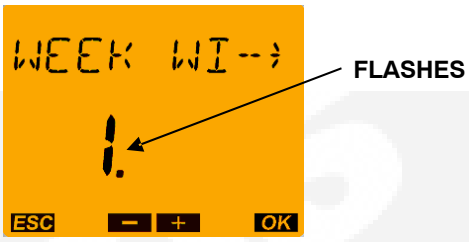
16. Press the OK push button to display the menu for setting the MONTH when the summer changeover will take place. Press the – or + push buttons until the desired MONTH is displayed.



17. Press the OK push button to display the menu for setting the week when the Summer changeover will take place. Press the – or + push buttons until the desired week (1 to 5 [1 = first week, 4 = fourth week, 5 = last week]) is displayed.

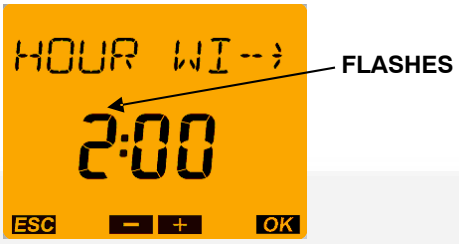


18. Press the OK push button to display the menu for setting the week DAY of the week when summer changeover will take place. Press the – or + push buttons until the desired week day (1 to 7 [1 = Monday, 7 = Sunday]) is displayed.



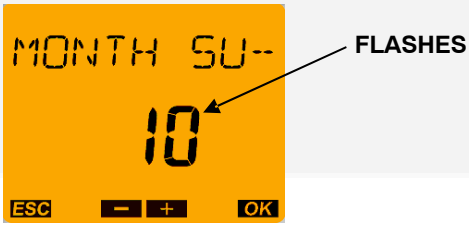
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday
7	Sunday

19. Press the OK push button to display the menu for setting the HOUR of the DAY when the summer changeover will place. Press the – or + push buttons until the desired HOUR is displayed.



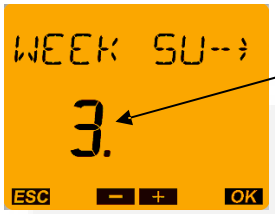
NOTE: The starting time can be set for 1.00 to 22.00 for 24h format and 1.00 to 12.00 for 12h format.

20. Press the OK push button to display the menu for setting the month when the winter changeover will take place. Press the – or + push buttons until the desired MONTH is displayed.



21. Press the OK push button to display the menu for setting the week when the winter changeover will take place. Press the – or + push buttons until

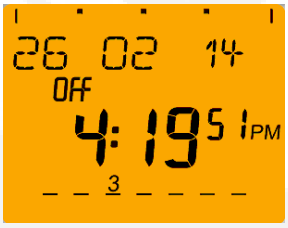
the desired week (1 thru 5 [1 = first week, 4 = fourth week, 5 = last
week]) is displayed.



WEEK TABLE	
1	first week
2	second week
3	third week
4	fourth week
5	last week

NOTE: The starting time for the winter changeover is the same time that was set previously.

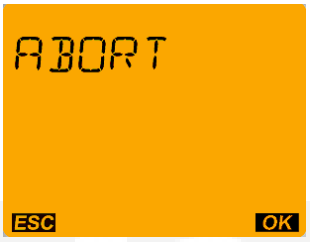
22. Press the OK push button followed by Menu button twice. The Home menu is displayed.



SETTING EXERCISE START/STOP TIMES

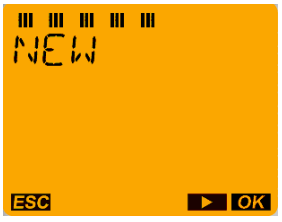
Up to 56 programs can be used to set exercise start and stop times. One program is required to start an exercise period and a second one is required to stop an exercise period.

NOTE: If the Menu button is pressed before a Start/Stop program is saved, the word ”ABORT” is displayed on the screen. The program settings are lost and the new menu is displayed after two seconds or by pressing the OK button.



1. From the Home menu, press the Menu button. The PROGRAM menu is displayed.

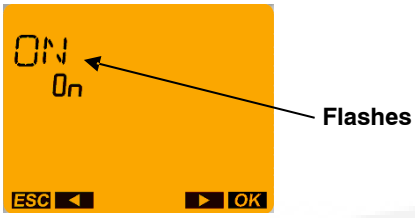
2. Press the OK push button. The NEW Program menu is displayed.



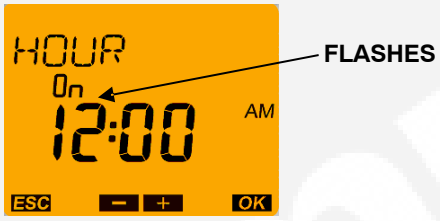
3. Press the OK push button. A brief fade–in now occurs which is only for the programming of the free memory locations. The number of available programmable time periods (maximum of 56) is temporarily displayed.

This fade–in can be prematurely ended by pressing the OK push button

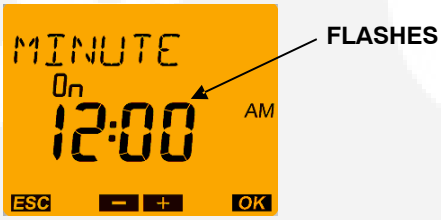
4. With the arrow push buttons – and + select channel status ON followed by confirmation using the OK push button.



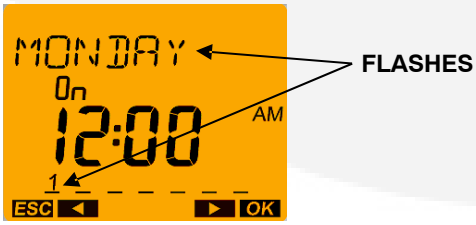
5. With arrow push buttons – and + set the HOUR for the switch–on (12:00 AM) and confirm with the OK push button.



6. With arrow push buttons – and + set the MINUTES for the switch–on (00 minutes) and confirm with the OK push button.

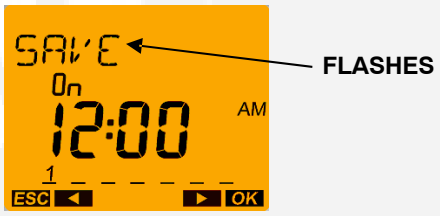


7. With the arrow push buttons – and + select the first weekday for the switching time (Monday = DAY1) followed by confirmation with the OK push button.



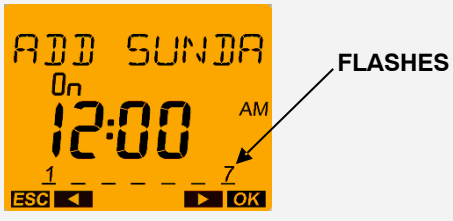
8. In order to copy the switching time to other weekdays confirm the COPY with the OK push button.

NOTE: With the push buttons– and + it is possible to change to SAVE if the switching time is only to be performed on this weekday. Then press OK, switching time would be saved ”individually” and a return to NEW would be made.



9. To repeat an exercise more than once a week, press the OK push button when the Copy menu is displayed. The Add ___DAY menu is displayed. The DAY after the DAY selected in step 7 is displayed.

10. Press the – or + push buttons to select the desired DAY of the week that an exercise is to begin. Press the OK button.



11. After the weekday SUNDAY, SAVE is offered again. The switch–on timing of Monday at 12:00 AM has now been copied from Sunday. Confirm the programming by pressing OK Push button.

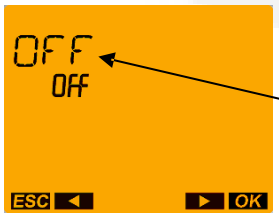
FLASHES

12. The New Program menu is redisplayed. The switch–off time still has to be entered.
Press OK Push button.

=13. Press the OK push button. A brief fade–in now occurs which is only for the programming of the free memory locations. The number of available programmable time periods (maximum of 55) is temporarily displayed.

*This fade–in can be prematurely ended by pressing the OK push button.

14. Instead of a switch–on (On) the push button – and + must be selected for a switch–off (Off) and confirm using the OK push button.

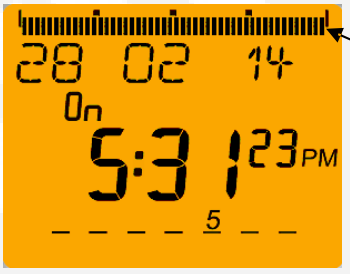


FLASHES

15. Repeat steps 5 through 11 to set up the stop time for your exercise.

16. Press the Menu button twice to return to the Home menu.

NOTE: If there are any exercises scheduled for the current DAY, those time period are indicated on the screen.



SCHEDULED EXERCISE

CHECKING THE PROGRAMS

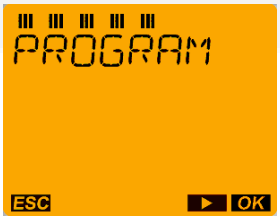
The Check Program menus can be used to review all set exercise start/stop times and, if necessary, delete them.

NOTE: If the Menu button is pressed while viewing start/stop programs, the Program Check function is aborted and the Home menu is redisplayed.

REVIEWING EXERCISE START/STOP TIMES

All exercise start and stop exercise parameters can be viewed from the Program Check menu. Normally, the starting time is followed by the ending time for a programmed exercise. However, if a second exercise period overlaps the time frame of the first exercise period in the current DAY, two start times are displayed, followed by two stop times.

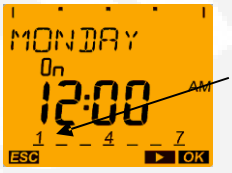
1. From the Home menu, press the Menu button. The Program menu is displayed.



2. Press the OK push button. The New Program menu is displayed.

3. Press the + push button once. The Check menu is displayed.

4. Press the OK push button. Now all programmed switching times are displayed classified on the time bar according to the time sequence starting with the first weekday (e.g. MONDAY).



FLASHES

NOTE: If no exercise periods are set up, the message ”EMPTY” is displayed. To return to the New Program menu, press the OK push button.

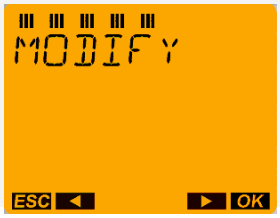
5. Review additional set exercise periods and return to the Main menu.
* To exit the Check Programs function without reviewing all set exercise periods, press the – or + push buttons until ”END” is displayed. Press the OK button followed by menu button twice to return to the Main menu.

MODIFYING EXCECISE START/STOP TIMES

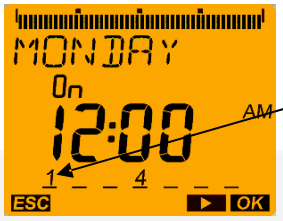
It is possible to change exercise start/stop times using the PROGRAM menu MODIFY.

1. From the Home menu, press the Menu button. The Program menu is displayed.

2. Press the OK push button. Press + push button twice the MODIFY menu is displayed.

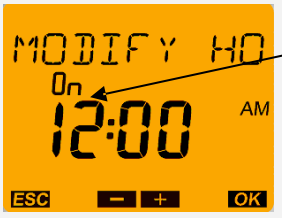


3. Press the OK push button. Now all programmed switching times are displayed classified on the time bar according to the time sequence starting with the first weekday (e.g. MONDAY).



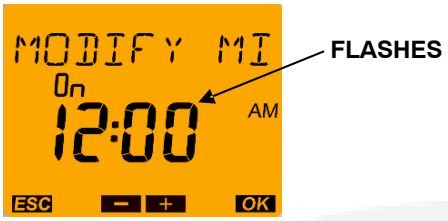
FLASHES

4. Press OK push button to modify the MONDAY switch–on time. The MODIFY HOUR menu is displayed.

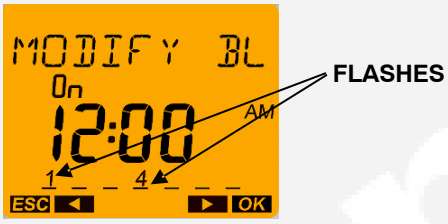


FLASHES

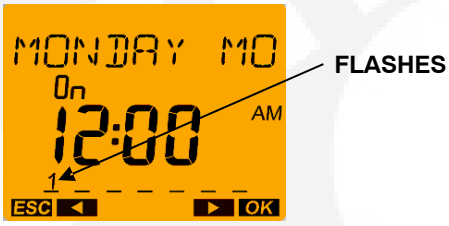
5. Press – and + push buttons to modify the HOUR. Press OK push button to display MODIFY MINUTE menu.



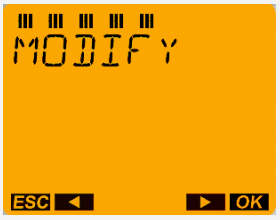
6. Press – and + push buttons to modify the Minutes. Press OK push button to display MODIFY BLOCK menu.



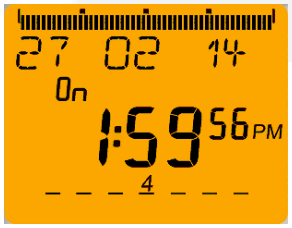
7. Press + push button to modify the Switch–on time day (MONDAY).



8. Press OK push button to return to MODIFY menu.



9. Press + push button until the ”END” is displayed, press OK button or with the MENU (ESC) push button the menu can be exited.

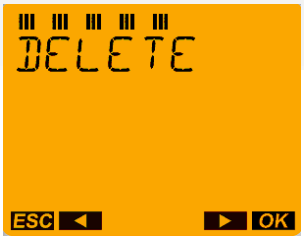


DELETING EXERCISE START/STOP TIMES

We can delete individual start and stop times.

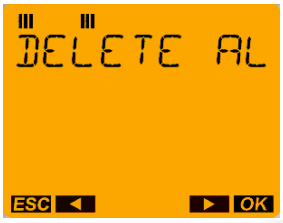
1. From the Home menu, press the Menu button. The PROGRAM menu is displayed.

2. Press the OK push button. Press + push button three times, the DELETE menu is displayed.

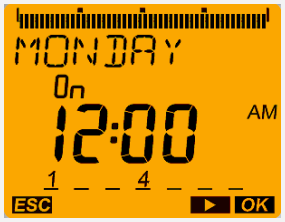


3. Press the OK push button. The SINGLE menu is displayed.

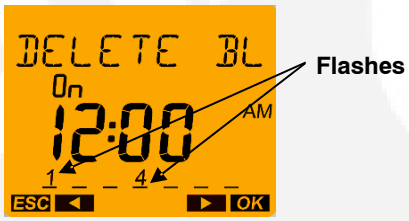
NOTE: In the DELETE submenu it is also possible to select what is to be deleted. In addition to deleting the switching times, it is also possible to select the menu item DELETE ALL using + push button. Here it is possible to jointly delete all saved switching commands for the selected channel.



4. Press OK push button. The first switching time saved for the first weekday is displayed



5. Press OK push button to display Delete block menu.The entire switching time block (switch–on at 9:00 AM from Monday to Sunday) can be deleted: DELETE BLOCK



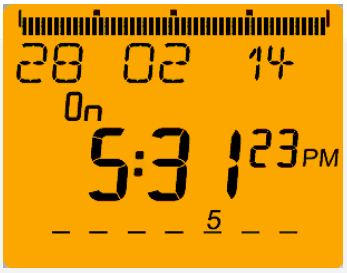
6. Press the + push button to remove MONDAY specifically from the block and delete it: DELETE MONDAY.

7. Press the OK push button. The confirmation of the delete procedure is displayed briefly followed by an automatic return to the DELETE menu.

8. Press the OK push button to delete the other switching times.

9. Press + push button until the ”END” is displayed.

10. Press OK push button or with the MENU (ESC) push button the menu can be exited.



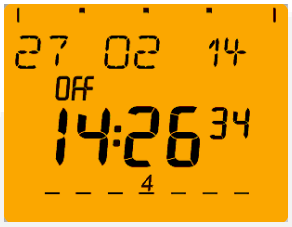
INITIATING OR OVERRIDING AN EXERCISE PROGRAM

The exercise clock has a built–in test feature that can be used to initiate an exercise that hasn't been programmed or cancel a programmed exercise in process.

The control panel Load/No Load function can be set to test the genset with or without load, as desired.

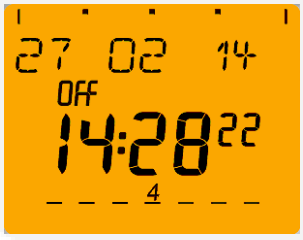
INITIATING AN EXERCISE

In the example shown below, ”Off” indicates that no exercise is currently active.



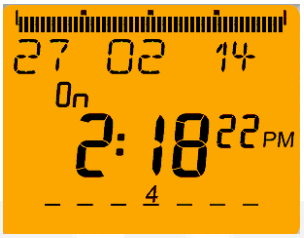
1. With the Home menu displayed, simultaneously press the –and + push buttons for approximately one second. ”OVERRIDE” symbol is displayed on the screen. In addition, ”Off” is switched to ”On” and the exercise is initiated.

2. To end the exercise, simultaneously press the – and + push buttons for approximately one second. The original Home menu is redisplayed and ”On” is switched back to ”Off.”



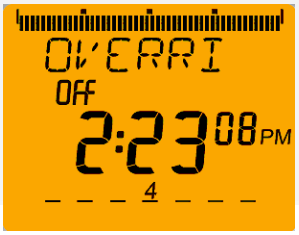
OVERRIDING AN EXERCISE

In the example shown below, ”On” indicates that an exercise is currently active.

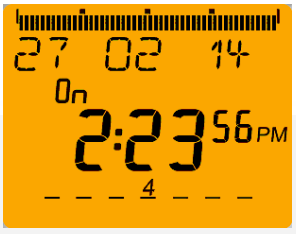


1. With the Home menu displayed, simultaneously press the – and + push buttons for approximately

one second. ”OVERRIDE” symbol is displayed on the screen. In addition, ”On” is switched to ”Off” and the exercise is stopped.



2. To restart the exercise, simultaneously press the – and + push buttons for approximately one second. The original Home menu is redisplayed and ”Off” is switched back to ”On.”

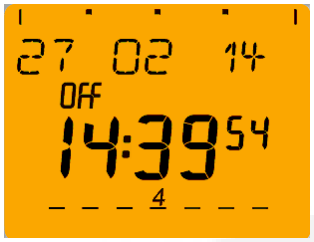


SELECTING PERMANENT ON/OFF MODE

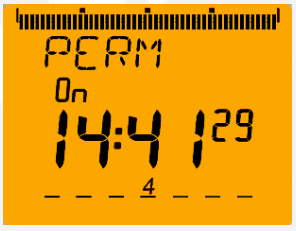
The exercise clock has a permanent on/off mode feature.

SELECTING PERMANENT ON/OFF MODE WITHOUT AN ACTIVE EXERCISE

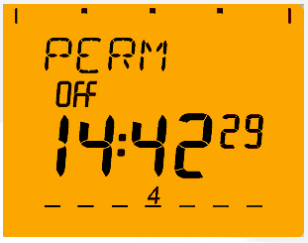
In the example shown below, ”Off” indicates that no exercise is currently active.



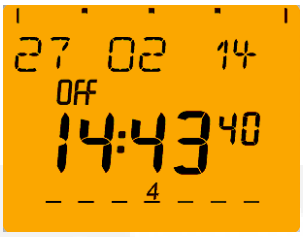
1. With the Home menu displayed, simultaneously press the – and + push buttons for approximately three seconds. The OVERRIDE menu is first displayed and then the ”PERM On” symbol is displayed on the screen. In addition, a continuous band of segments is displayed on top of the screen and ”Off” is switched to ”On.”



2. To switch to Permanent Off mode, press the – and + push buttons for approximately three seconds.”PERM Off” is displayed and ”On” is switched back to ”Off.”

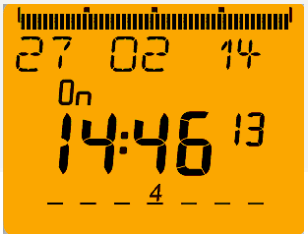


3. To return the clock to its original state, simultaneously press the – and + push buttons for approximately one second. The original Home menu is redisplayed.

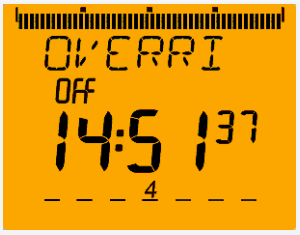


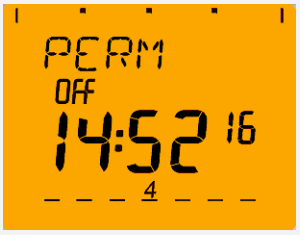
SELECTING PERMANENT ON/OFF MODE WITH AN ACTIVE EXERCISE

In the example shown below, ”On” indicates that an exercise is currently active.



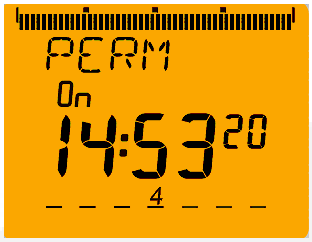
1. With the Home menu displayed, simultaneously press the – and + push buttons for approximately three seconds. The Override menu is first displayed and then the ”PERM Off” symbol is displayed on the screen.
In addition, ”On” is switched to ”Off.”



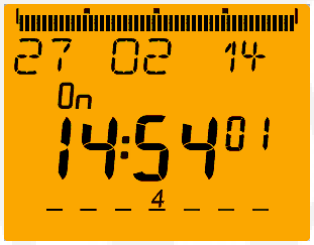


2. To switch to Permanent On mode, press the – and + push buttons for approximately three seconds” PERM On” is displayed and ”Off” is switched back to ”On.” In addition, a continuous band of seg-

ments is displayed on top of the screen.



3. To return the clock to its original state, simultaneously press the – and + push buttons for approximately one second. The original Home menu is redisplayed.

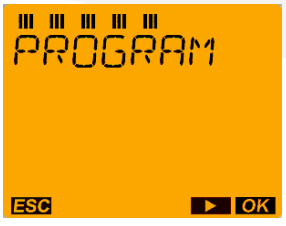


ADDING A SECURITY CODE

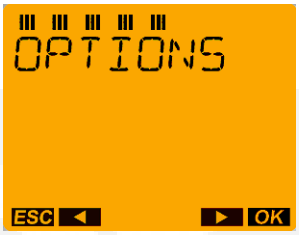
A 4–digit security code number can be entered to prevent unauthorized personnel from using the clock. Once a security code has been set up, the exercise clock is locked 75 seconds after the last keystroke. It can only be operated again after the correct PIN code is entered.

CAUTION: Once a PIN code has been activated and the Reset button is pressed (See ”Resetting the Timer” on the following page), the exercise timer can no longer be activated without a valid PIN code.

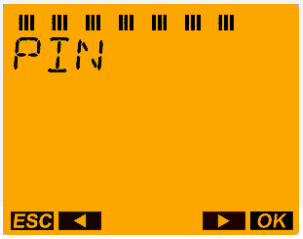
1. From the Home menu, press the Menu button. The PROGRAM menu is displayed.



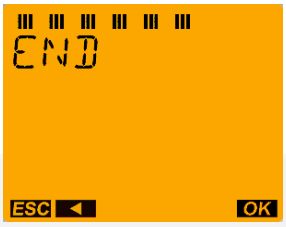
2. Press the + push button three times. The OPTIONS menu is displayed.



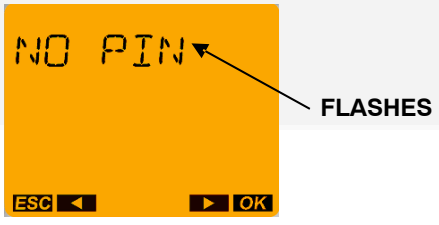
3. Press the OK push button, then press + push button until PIN menu appears.



NOTE: If the – or + push buttons is pressed now, the message ”END” is displayed. Press the OK push button to return to the Home menu.

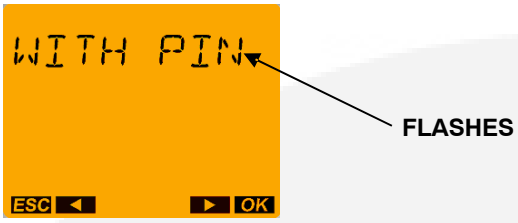


4. Press the OK push button to display the NO PIN menu.

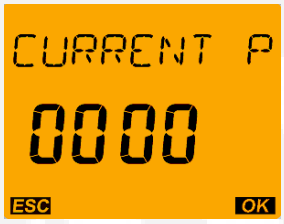


NOTE: If NO PIN is selected and confirmed with the OK push button a return is made to PIN.

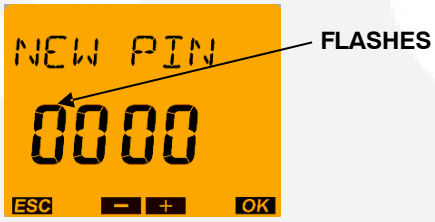
5. Press the – or + push buttons to display the WITH PIN menu.



6. Press the OK push button to display the CURRENT PIN (here 0000). Continue with the OK push button.



7. The NEW PIN appears on the display. The first number flashes.



8. Press the – or + push buttons to enter the first digit of the PIN code and confirmed with the OK push button.

9. After this, the second, third and fourth number of the PIN code is stipulated. As soon as the fourth number

Has been confirmed with the OK push button a return is made to the auto mode.

IMPORTANT NOTE: The PIN number is immediately valid and the time switch is locked by it.

Additional information: ”Super PIN”

o In time switch a super PIN code is stored individually for each device with which the time switch can be unlocked in spite of a set PIN. This super PIN specific to each device ensures that the time switch can be unlocked again if the PIN code has been forgotten.

o The super PIN code is calculated from a special algorithm from the time switch device serial number.This serial number, specific to each device, can be seen on the right–hand side of the housing.

o The super PIN software with the special algorithm is available from Theben AG.
If required please contact the Theben hotline.

AFTER PROGRAMMING THE EXERCISE CLOCK

1. Make sure the External Exercise function on the transfer switch control panel is set to ”On”.

2. Place the generator set operation selector switch in the Remote position.

3. Check the system for proper operation as described in the Operator’s Manual.

RESETTING THE TIMER

The Reset button should only be used in cases of an emergency. Reset is achieved by pressing all 4 push buttons at the same time. By resetting, all configuration settings (time format, 24 HOURs or AM/PM, etc.) are maintained. DATE and time are however deleted. The selection ”Keep program” or ”Delete program” is available. ”Delete program” must be confirmed separately. With ”Delete program” all switching commands and the holiday program are deleted.

OPTIONAL EXTERNAL EXERCISER (0307–3053)

The optional external exercise clock is a 7-day, 24-hour clock that, when installed, can store and execute several start/stop programs per day and repeat exercise periods every week. It can be programmed to run exercise periods at different times on different days. Unlike the integrated exerciser, the external exercise can schedule an exercise period for something other than 20 minutes.

If the External Exercise function is enabled (set to On), then the integrated exerciser is disabled.

NOTE: After a period of inactivity, the clock enters sleep mode and turns off the display. To reactivate the display, briefly press the Menu button.

Up to 28 programs are available to set exercise start and stop times. One program is required to start an exercise period and a second one is required to stop an exercise period.

The exerciser clock also has a built-in test feature that can be used to initiate a generator set start and run cycle.

The exerciser clock contains a lithium battery that is used as a backup power source. The battery is not replaceable. When the clock is running off the internal battery, three flashing dots are displayed between the hour and minute values (see Figure 4-3). Unless the clock battery fails, exercise programs are stored and are not lost during a power outage.

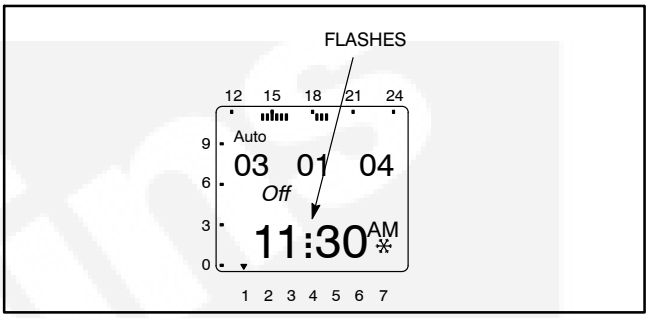


FIGURE 4-3. INDICATOR OF CLOCK RUNNING OFF THE INTERNAL BATTERY

Figure 4-4 illustrates the face of the exercise clock and provides information on the display and the function of the buttons.

The clock is programmed with the correct date and central USA standard time and with the correct daylight savings time settings. Programming the exerciser clock requires entering the exercise start and stop times and, if necessary, adjusting the time as described on the following pages.

Exercise With or Without Load

The external exercise clock does not include an exercise with or without load function. This function must be configured using the transfer switch control panel. For more information, see *Section 5*.

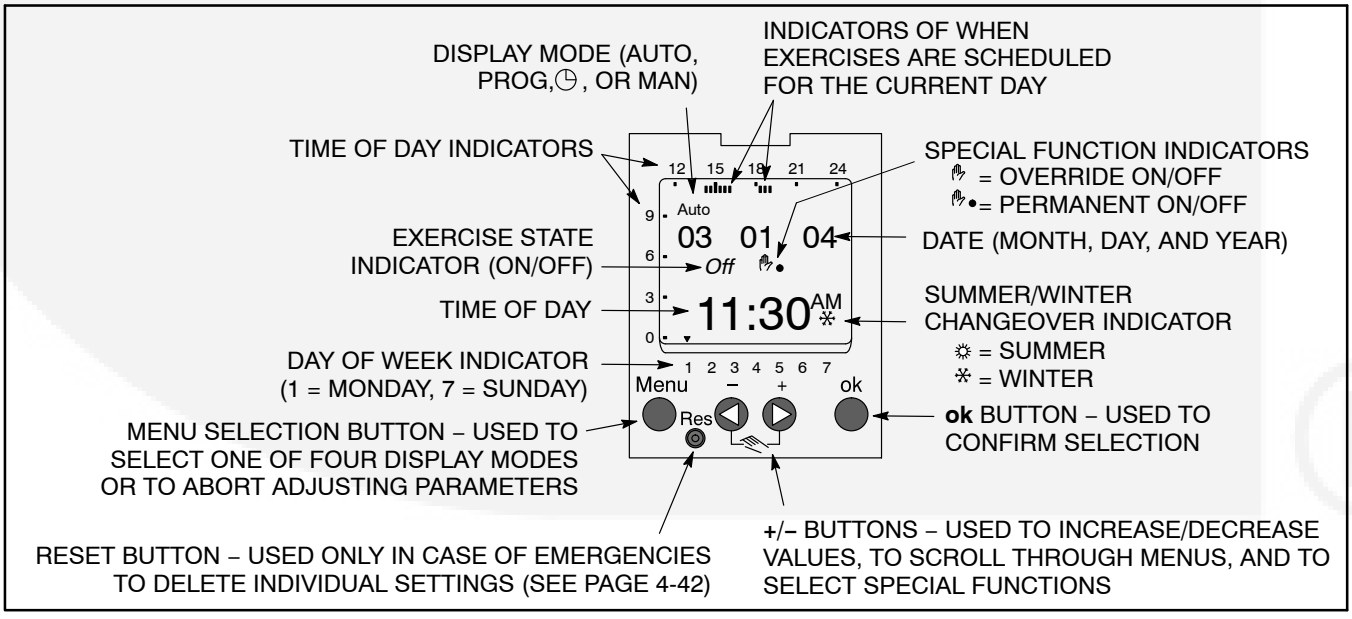


FIGURE 4-4. EXERCISE CLOCK FEATURES

Using the Menu Button

The Menu selection button is used to select three display modes that have adjustable menus.

- The Clock mode (◷) is used to set the correct date and time. This mode can also be used to automatically switch to the correct summer/winter time. See page 4-28.
- The Program mode (Prog) is used to set (see page 4-31), review (see page 4-34), and clear exercise start/stop times (see pages 4-37 and 4-38).
- The Manual mode (Man) is used to enter a 4-digit code to prevent changing settings by unauthorized personnel. See page 4-41.

When adjustments are completed, the Home menu (Auto mode) is redisplayed (see Figure 4-3). The Menu button can also be used to abort adjusting parameters and return to the Home menu.

Using the +/– Buttons

Pressing the + or – button is used to:

- Increase or decrease a parameter in an adjustable menu
- Select the next or previous menu.

Simultaneously pressing the + and – buttons is used to select special functions.

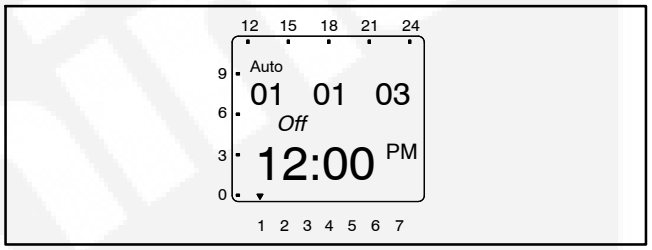
- Initiate an exercise (see page 4-39)
- Override an active exercise (see page 4-39)
- Select permanent on/off mode (see page 4-40)

Using the ok Button

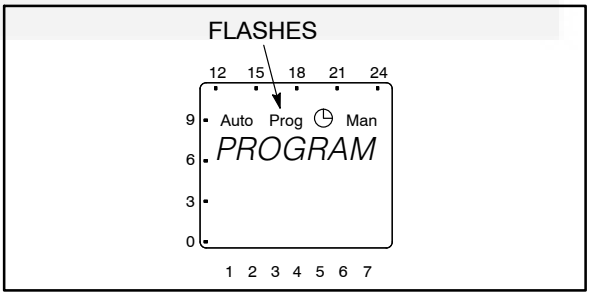
The **ok** button is used to confirm the menu selection or program adjustments you have made. Upon pressing the **ok** button, the next available menu is displayed and, if any program adjustments were made, the changes are saved.

Setting the Clock with Summer/Winter Time (Daylight Savings Time)

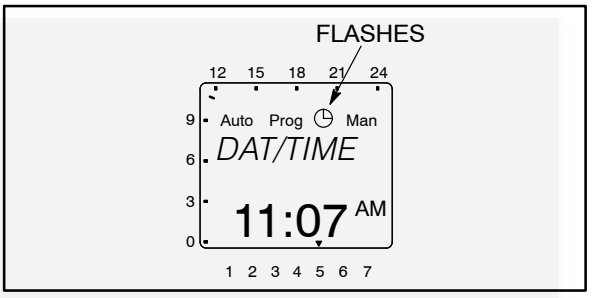
The clock is programmed with the correct date and central USA standard time and with the correct daylight savings time settings. If it is necessary to change these settings, the following describes how to adjust the time and date and how to set the clock to automatically switch to summer/winter time (daylight savings time).



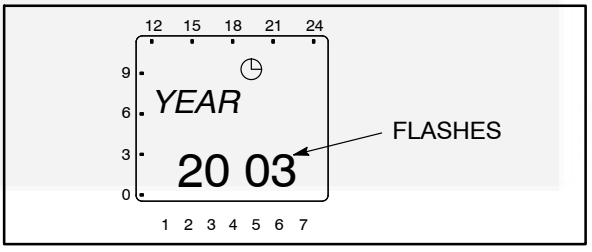
1. Press the Menu button on the exercise clock. The Program menu is displayed.



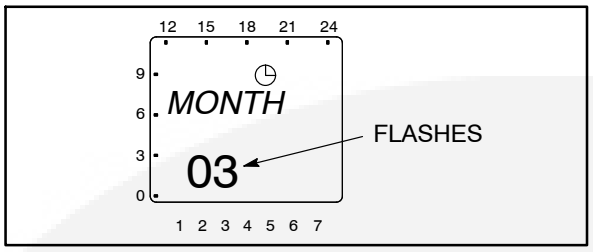
2. Press the + button. The Date/Time menu is displayed.



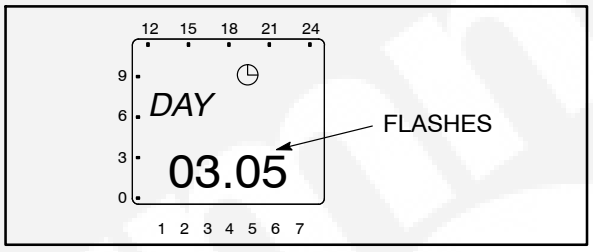
3. Press the **ok** button to display the Year menu.



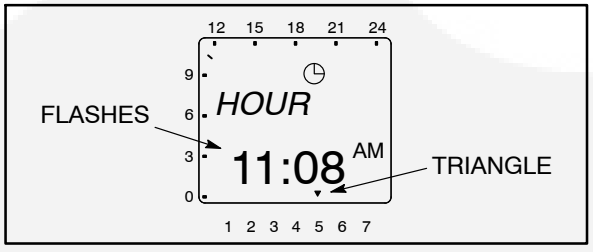
4. Press the + or – button to set the correct year. Press the **ok** button to display the Month menu.



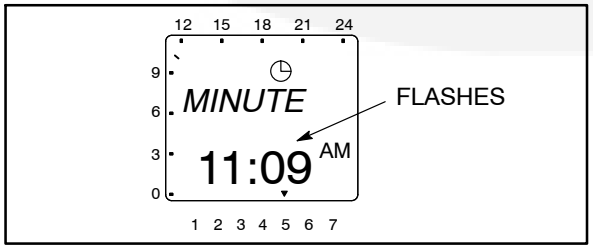
5. Press the + or – button to set the correct month. Press the **ok** button to display the Day menu.



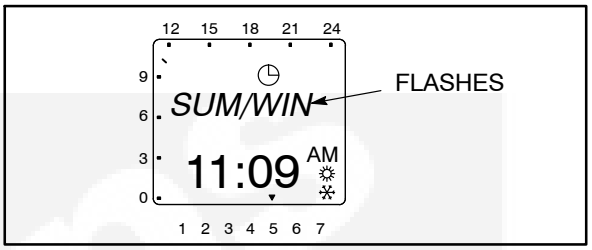
6. Press the + or – button to set the correct day. Press the **ok** button to display the Hour menu. A small triangle is displayed above the assigned number in the display for the day of the week (1 = Monday, 7 = Sunday).



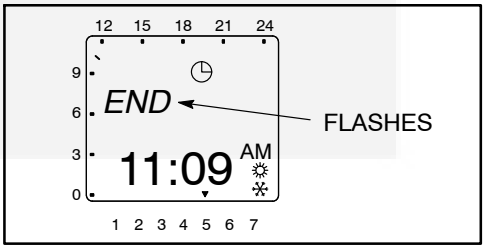
7. Press the + or – button to set the correct hour. A line is displayed on the screen indicating the hour of the day selected (the left side of the screen is for the first half of the day [AM] and the top of the screen is for the second half of the day [PM]). Press the **ok** button to display the Minute menu.



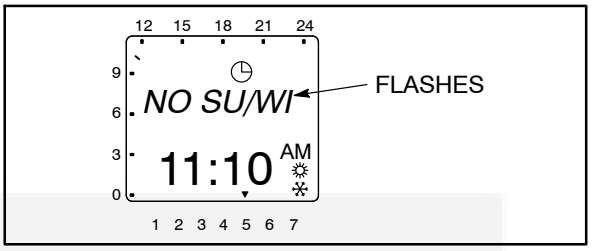
8. Press the + or – button to set the correct minute. Press the **ok** button to display the Summer/Winter menu.



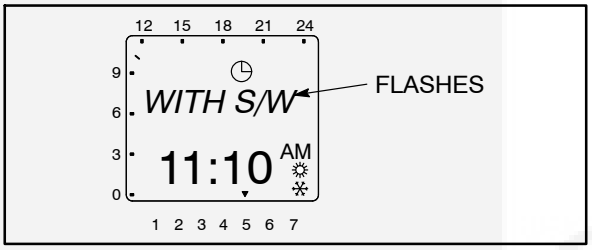
NOTE: If you do not wish to set the clock for automatic summer/winter changeover at this time, press the + or – button. "End" is displayed on the screen. Press the **ok** button to return to the Home menu.



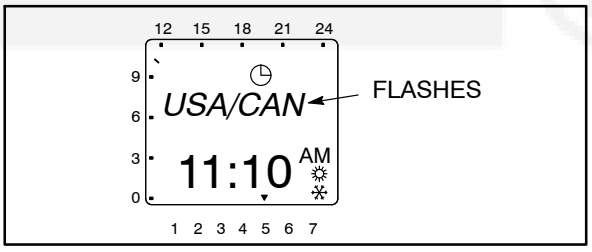
9. Press the **ok** button to display the No Summer/Winter menu.



10. Press the + or – button to display the With Summer/Winter menu.



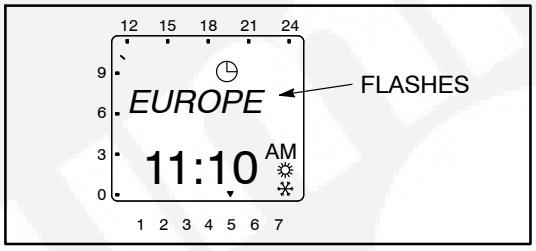
11. Press the **ok** button to display the World Area menu.



12. Either select one of the world areas that has been programmed for automatic time correction or else set up your own changeover times.

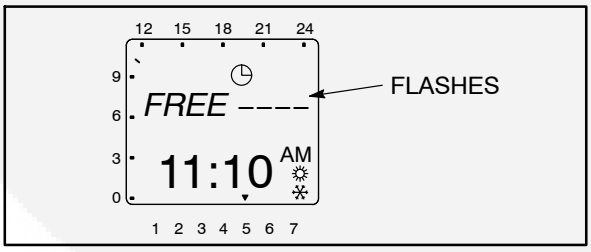
NOTE: With the Daylight Savings Time program set for North America,
- The second Sunday in March moves the time forward one hour.
- The first Sunday in November moves the time back one hour.

– If you wish to select one of the world areas (Europe, GP/P, SF/GR/TR, USA/CAN) that has been programmed for automatic time correction, press the + or – buttons until the correct world area is selected. Go to step 19.

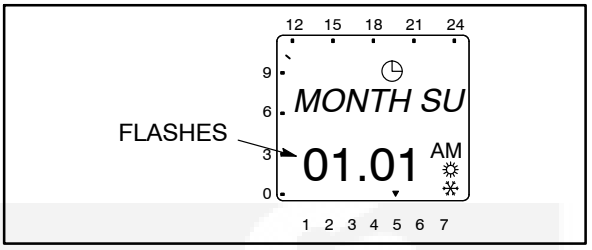


– If you wish to set up your own changeover times, continue with step 13.

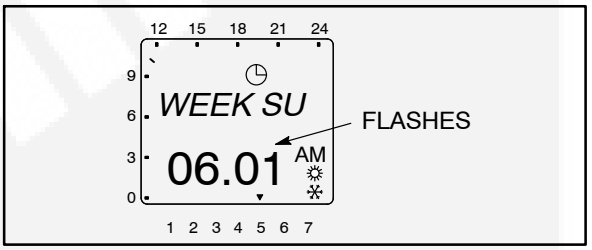
13. To set up your own changeover times, press the + or – buttons from the World Area menu until the word “Free” is displayed.



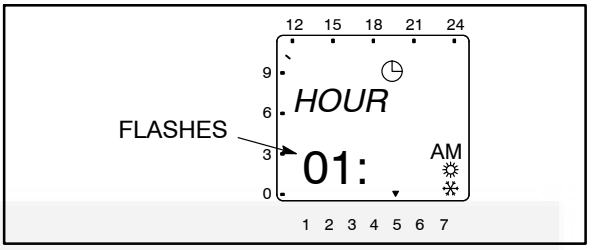
14. Press the **ok** button to display the menu for setting the month when the Summer changeover will take place. Press the + or – buttons until the desired month is displayed.



15. Press the **ok** button to display the menu for setting the week when the Summer changeover will take place. Press the + or – buttons until the desired week (1 thru 5 [1 = first week, 4 = fourth week, 5 = last week]) is displayed.

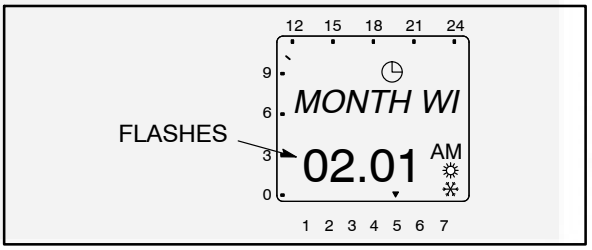


16. Press the **ok** button to display the menu for setting the hour of the day when the Summer changeover will take place. Press the + or – buttons until the desired hour (1 thru 3) is displayed.

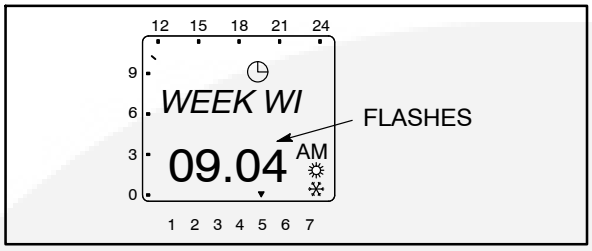


NOTE: The starting time can only be set for 1:00, 2:00, or 3:00 AM.

17. Press the **ok** button to display the menu for setting the month when the Winter changeover will take place. Press the + or – buttons until the desired month is displayed.

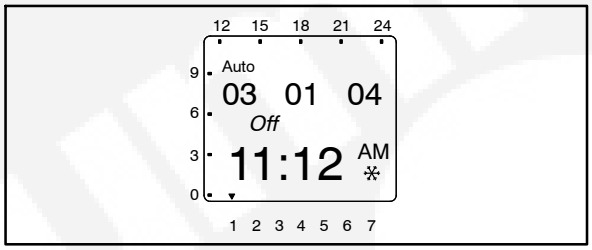


18. Press the **ok** button to display the menu for setting the week when the Winter changeover will take place. Press the + or – buttons until the desired week (1 thru 5 [1 = first week, 4 = fourth week, 5 = last week]) is displayed.



NOTE: The starting time for the winter changeover is the same time that was set in step 16.

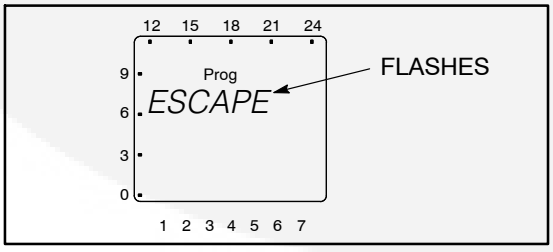
19. Press the **ok** button. The Home menu is redisplayed and the appropriate summer/winter symbol is displayed.



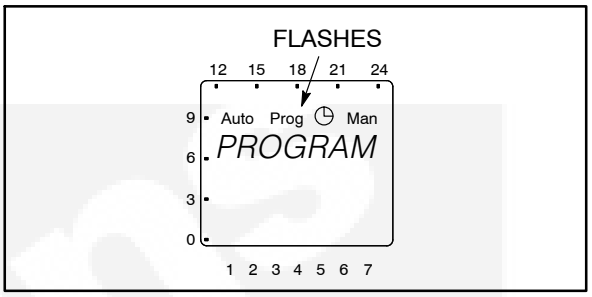
Setting Exercise Start and Stop Times

Up to 28 programs can be used to set exercise start and stop times. One program is required to start an exercise period and a second one is required to stop an exercise period.

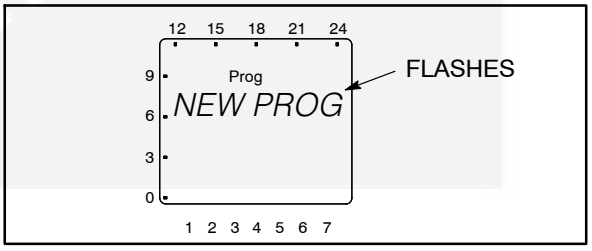
NOTE: If the Menu button is pressed before a Start/Stop program is saved, the word "Escape" is displayed on the screen. The program settings are lost and the Home menu is displayed after two seconds or by pressing the **ok** button.



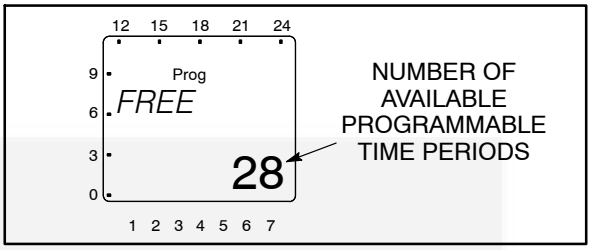
1. From the Home menu, press the **Menu** button. The Program menu is displayed.



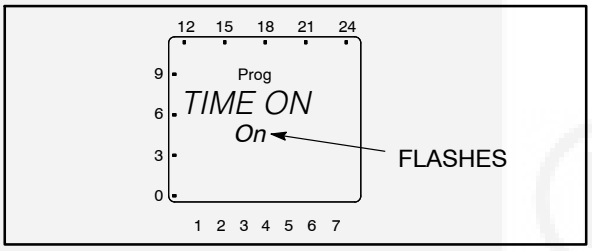
2. Press the **ok** button. The New Program menu is displayed.



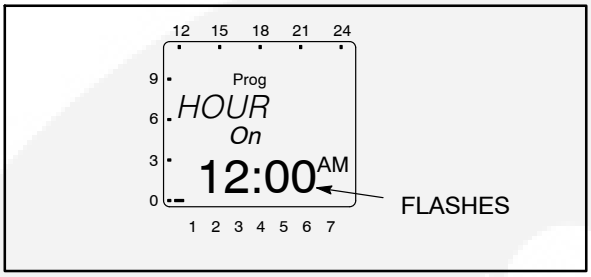
3. Press the **ok** button. The number of available programmable time periods (maximum of 28) is temporarily displayed.



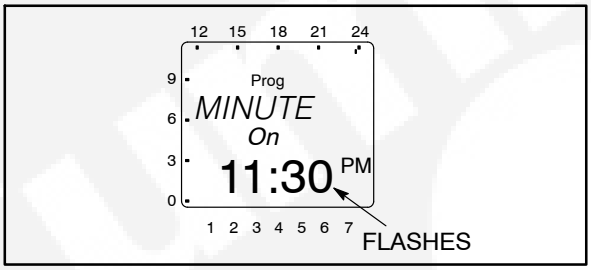
4. The Starting Time (Time On) menu is displayed. Press the **ok** button.



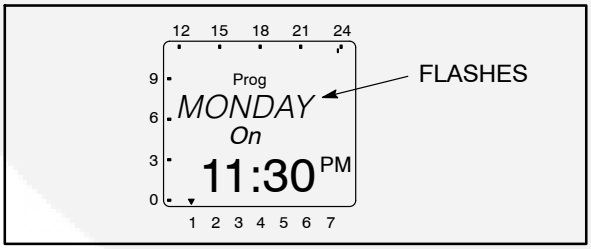
5. The Hour menu is displayed. Press the + or – buttons to set the desired exercise starting hour (default = 12:00 AM). A line is displayed on the screen indicating the hour of the day selected (the left side of the screen is for the first half of the day [AM] and the top of the screen is for the second half of the day [PM]). Press the **ok** button.



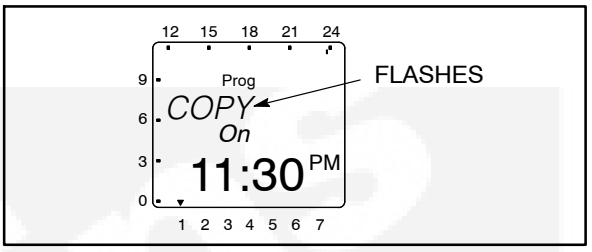
6. The Minute menu is displayed. Press the + or – buttons to set the desired exercise starting minute. Press the **ok** button.



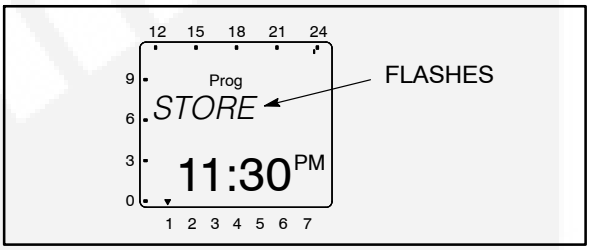
7. A menu is displayed for selecting the day of the week the exercise is to begin (default = Monday). Press the + or – buttons to select the desired day of the week. A small triangle is displayed above the assigned number in the display for the day of the week (1 = Monday, 7 = Sunday). Press the **ok** button.



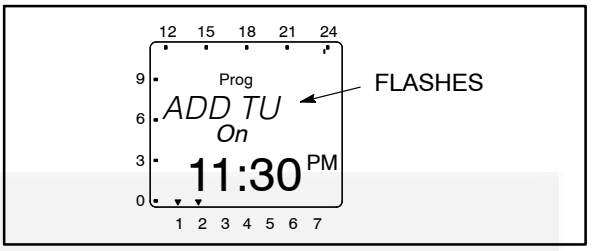
8. The Copy menu is displayed. If you do not wish to have the exercise repeat more than once a week, go to step 9. If you do wish to have the exercise repeat more than once a week, go to step 10.



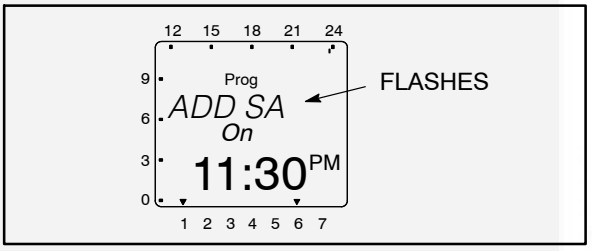
9. Press the + or – buttons. The Store menu is displayed. Press the **ok** button. Go to step 13.



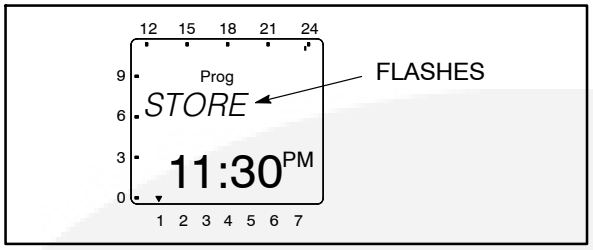
10. To repeat an exercise more than once a week, press the **ok** button when the Copy menu is displayed. The Add ___day menu is displayed. The day after the day selected in step 7 is displayed.



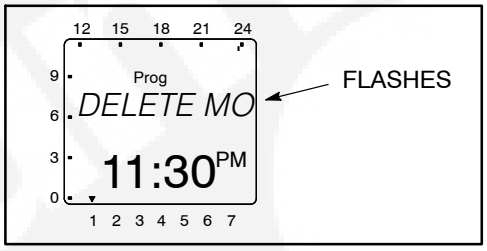
11. Press the + or – buttons to select the desired day of the week that an exercise is to begin. Press the **ok** button.



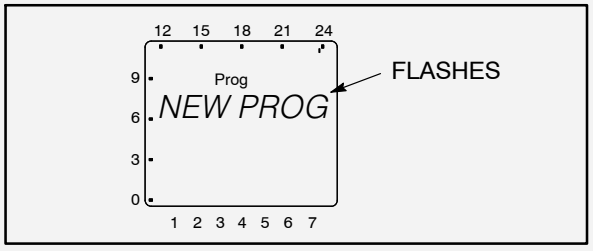
12. Press the + or – buttons. The Store menu is displayed. Press the **ok** button.



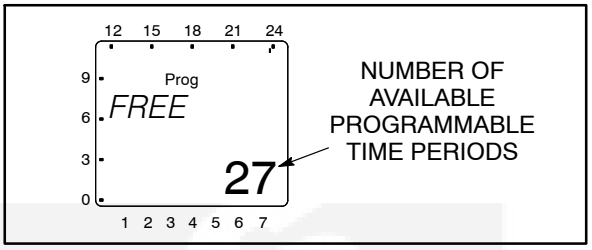
NOTE: After setting all days of the week that an exercise is to be repeated, you can use the + or – buttons to cycle through the days and recheck the programs. When a day that has a set program is redisplayed, it can be deleted. In the menu shown below, press the **ok** button to delete the displayed program.



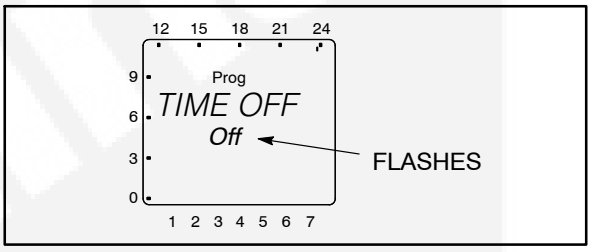
13. The New Program menu is redisplayed.



14. Press the **ok** button to enter a time the exercise is to end. The number of available programmable time periods is temporarily displayed. Please note that the number of available programmable time periods has now decreased by one.

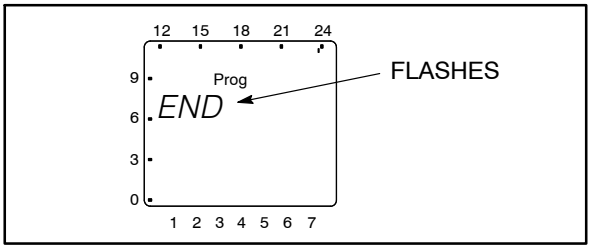


15. The Ending Time (Time Off) menu is displayed. Press the **ok** button.



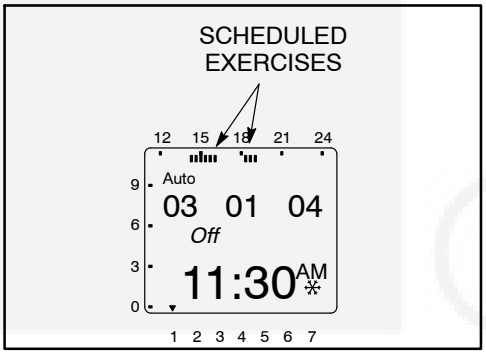
16. Repeat steps 5 thru 13 to set the stop time for your exercise.

17. When the New Program menu is redisplayed, press the + or – buttons until “End” is displayed.



18. Press the **ok** button to return to the Home menu.

NOTE: If there are any exercises scheduled for the current day, those time periods are indicated on the screen.



Checking the Programs

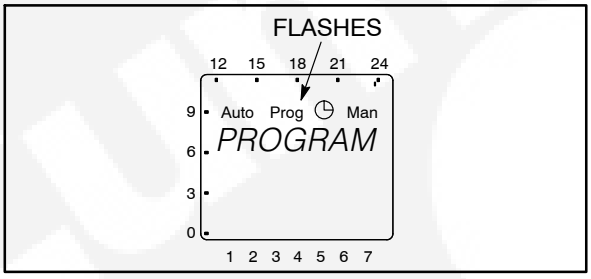
The Check Program menus can be use to review all set exercise start/stop times and, if necessary, delete them.

NOTE: If the Menu button is pressed while viewing start/stop programs, the Program Check function is aborted and the Home menu is redisplayed.

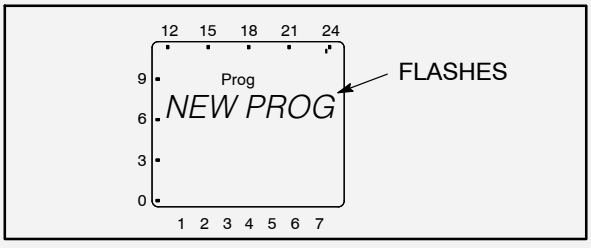
Reviewing Exercise Start/Stop Times

All exercise start and stop exercise parameters can be viewed from the Program Check menu. Normally, the starting time is followed by the ending time for a programmed exercise. However, if a second exercise period overlaps the time frame of the first exercise period in the current day, two start times are displayed, followed by two stop times.

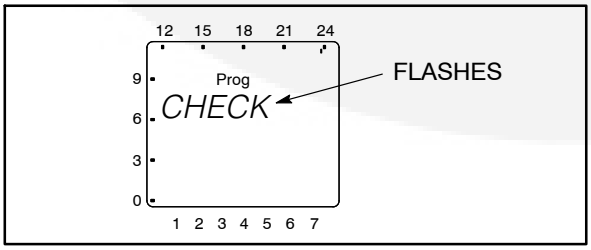
1. From the Home menu, press the **Menu** button. The Program menu is displayed.



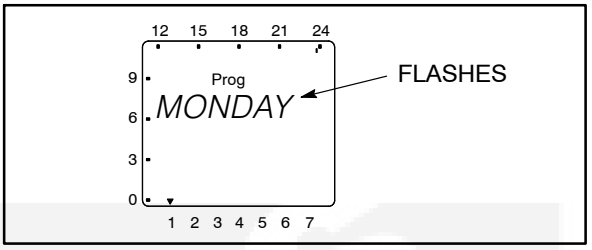
2. Press the **ok** button. The New Program menu is displayed.



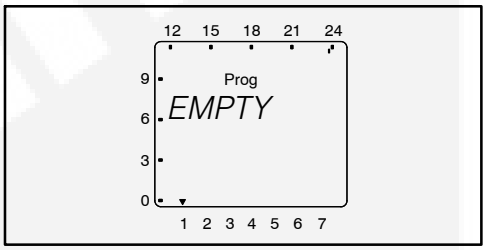
3. Press the + button once. The Check menu is displayed.



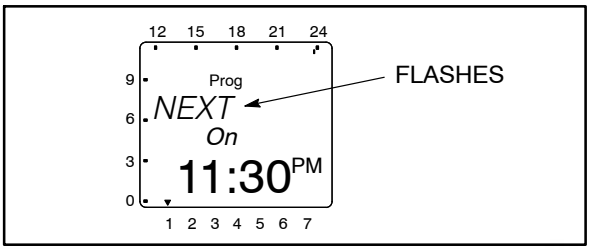
4. Press the **ok** button. The Monday menu is displayed.



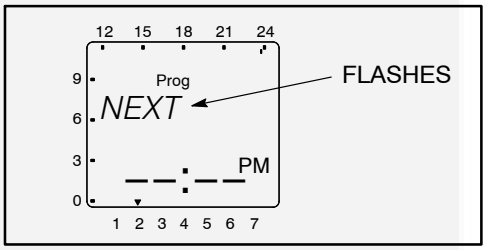
NOTE: If no exercise periods are set up, the message “Empty” is displayed. To return to the New Program menu, press the **ok** button.



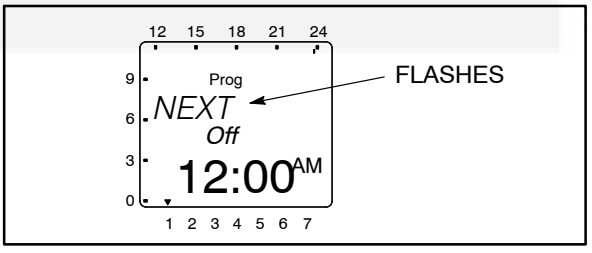
5. Use the + or – buttons to select the day of the week you wish to check. Press the **ok** button. The starting time for the first exercise for the selected day is displayed.



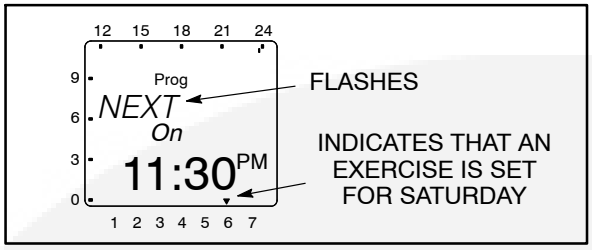
NOTE: If a day does not have any set exercise periods, the screen below is displayed.



6. Press the **ok** button. The ending time for the first exercise for the selected day is displayed.

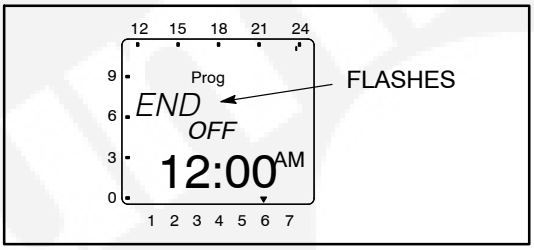


7. Press the **ok** button. The next exercise start time is displayed. If the next start time is not on the day selected in step 5, the day of the week is indicated on the bottom of the screen.

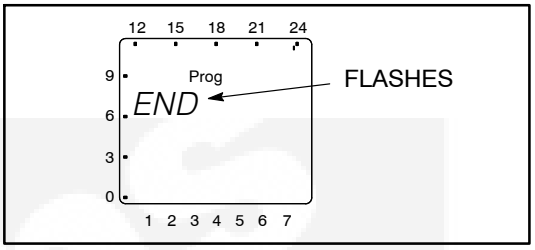


8. Review additional set exercise periods and return to the Main menu.

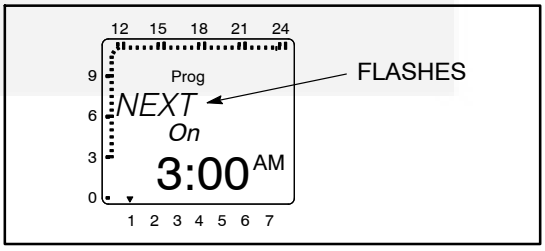
   – To exit the Check Programs function without reviewing all set exercise periods, press the + or – buttons until "END" is displayed. Press the **ok** button to return to the Main menu.



   – To review all set exercise periods, repeat steps 6 and 7 until the word "END" is displayed. Press the **ok** button to return to the Main menu.



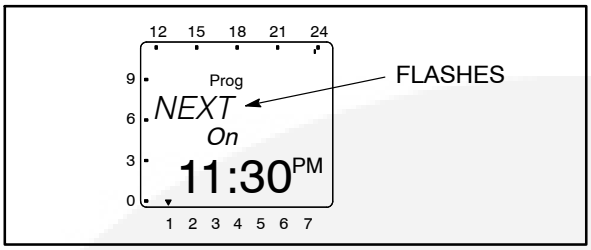
NOTE: If an exercise period has been programmed with a start time only, a continuous band of segments is displayed on the left side and top of the screen showing the time of day the incomplete exercise period is set to begin. This band of segments is also displayed on any other exercise periods scheduled for that day.



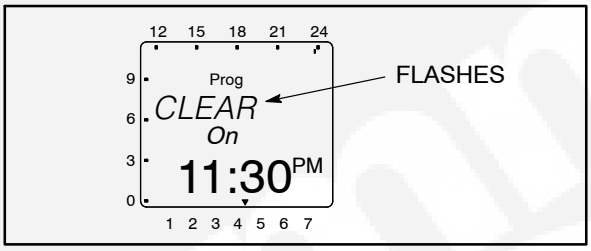
If an exercise period has been programmed with a stop time only, no special indicator is displayed. The stop time is simply ignored.

Deleting Exercise Start/Stop Times

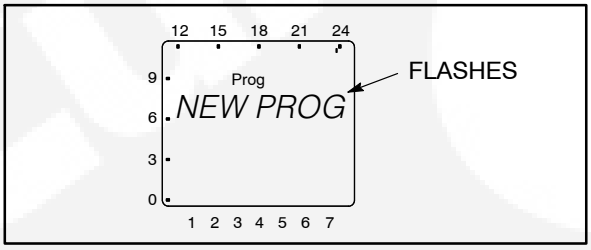
While checking the programs, you can also delete individual start and stop times.



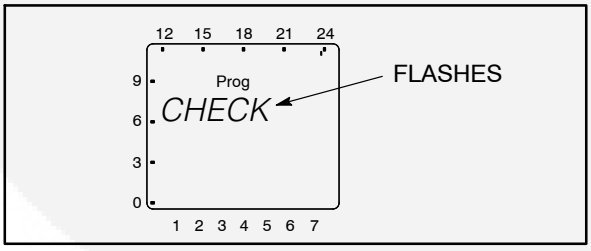
1. When an programmed exercise start time is displayed, press the + or – buttons until “Clear” is displayed.



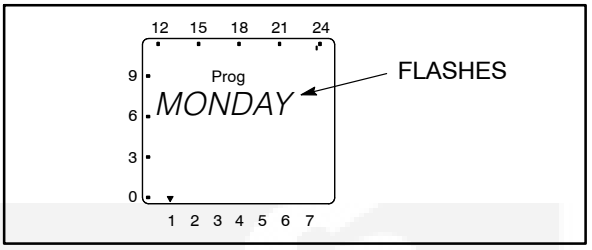
2. Press the **ok** button. The New Program menu is redisplayed.



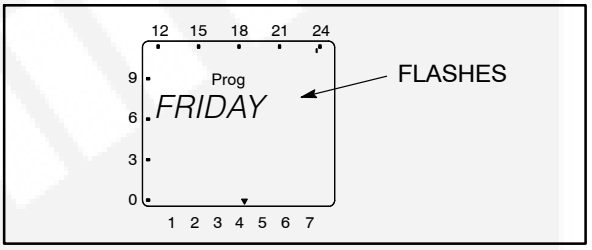
3. Press the + button once. The Check menu is displayed.



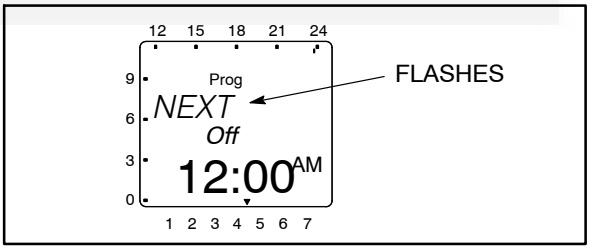
4. Press the **ok** button. The Monday menu is displayed.



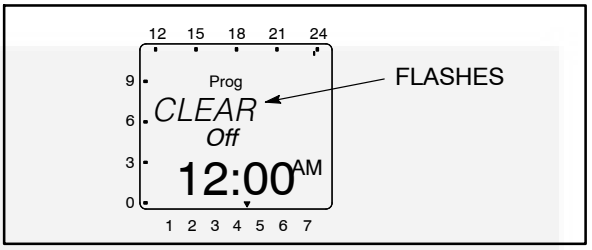
5. If necessary. use the + or – buttons to select the day of the week that includes the exercise ending time you wish to delete.



6. Press the **ok** button.



7. Press the + or – buttons until “Clear” is displayed.

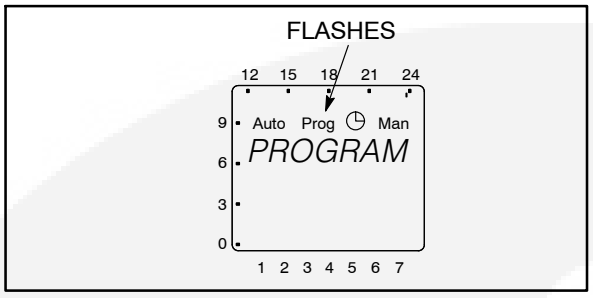


8. Press the **ok** button. The New Program menu is redisplayed.

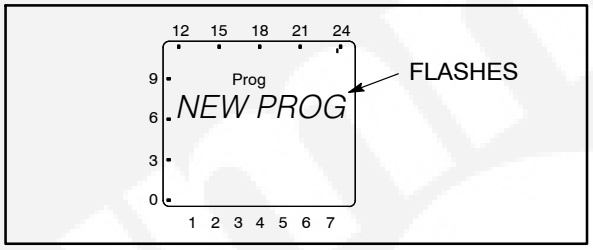
Individual or all exercise periods can also be cleared. For more information, see “Erasing (Clearing) A Programmed Exercise Period” and “Erasing (Clearing) All Exercise Periods” below.

Erasing (Clearing) A Programmed Exercise Period

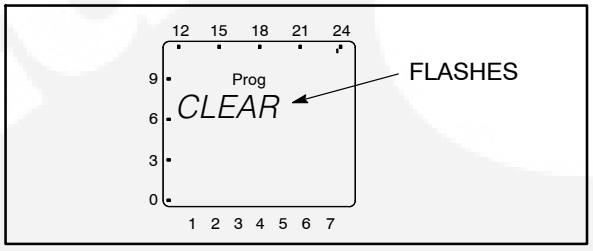
1. From the Home menu, press the **Menu** button. The Program menu is displayed.



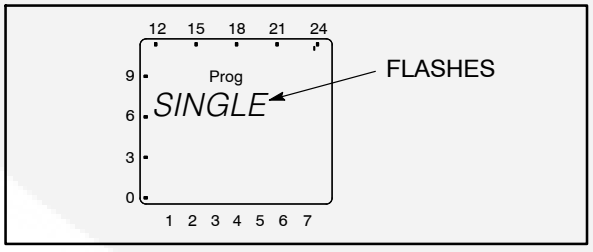
2. Press the **ok** button. The New Program menu is displayed.



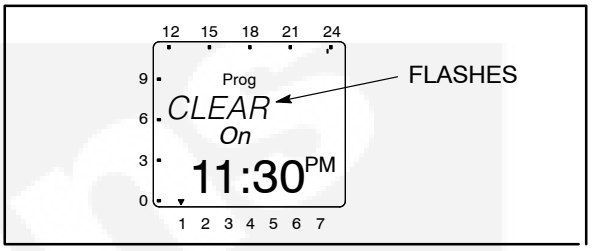
3. Press the + or – button until the Clear menu is displayed.



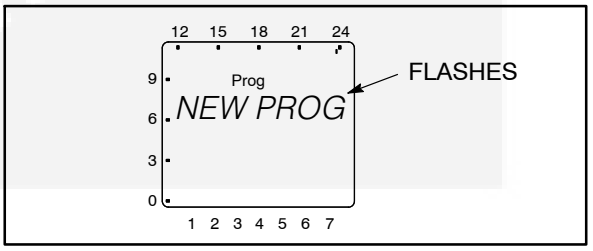
4. Press the + or – button until “Single“ is displayed.



5. Press the **ok** button. The first exercise start time of the week is displayed. To select a different exercise start time, press the + or – buttons until the desired time is displayed.



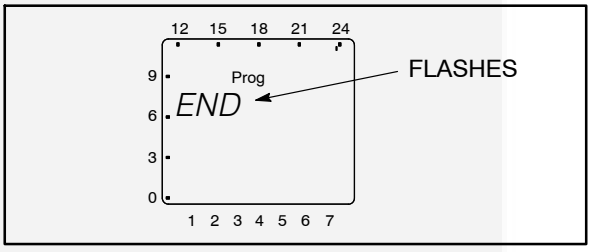
6. Press the **ok** button. The New Program menu is redisplayed.



7. Repeat steps 3 thru 6 to erase the stop time for the exercise period erased above.

8. If necessary, repeat steps 3 thru 7 for any additional exercise periods that need to be erased.

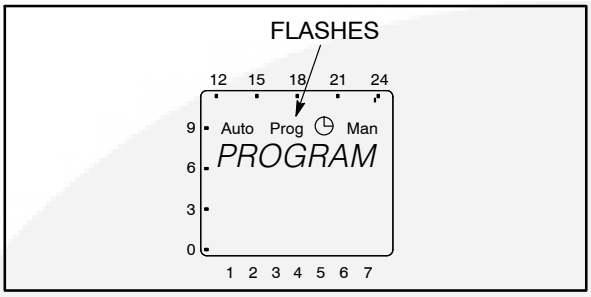
9. When the New Program menu is redisplayed, press the + or – buttons until the word “END” is displayed.



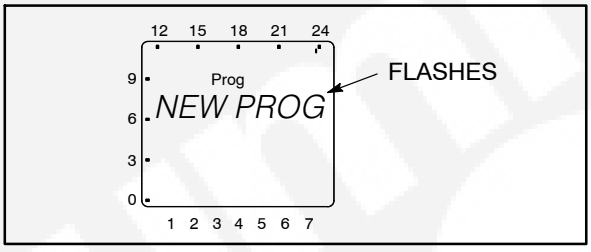
10. Press the **ok** button to return to the Home menu.

Erasing (Clearing) All Programmed Exercise Periods

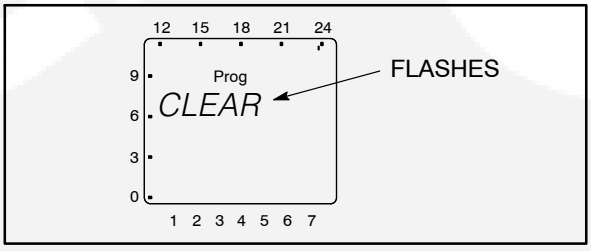
1. From the Home menu, press the **Menu** button. The Program menu is displayed.



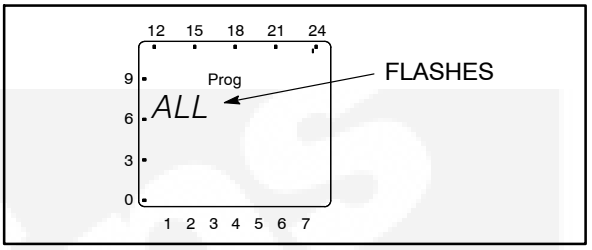
2. Press the **ok** button. The New Program menu is displayed.



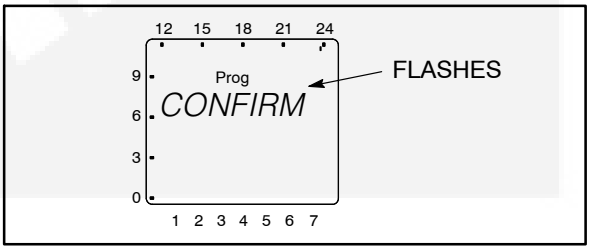
3. Press the + or – buttons until the Clear menu is displayed.



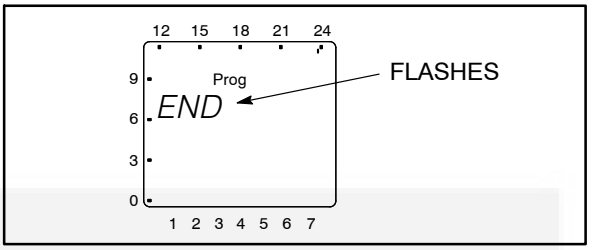
4. To clear all set exercise periods, press the + or – buttons until "All" is displayed. Press the **ok** button.



5. The word "Confirm" is displayed. To continue clearing all exercise programs, press the **ok** button. To abort clearing all exercise programs, press the + or – buttons.



6. The new program menu is redisplayed. Press the + or – buttons until the word "END" is displayed.



7. Press the **ok** button to return to the Home menu.

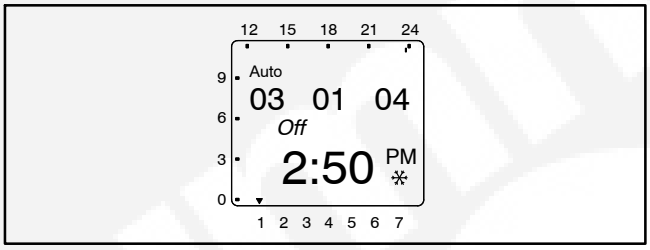
Initiating or Overriding an Exercise Program

The exercise clock has a built-in test feature that can be used to initiate an exercise that hasn't been programmed or cancel a programmed exercise in process.

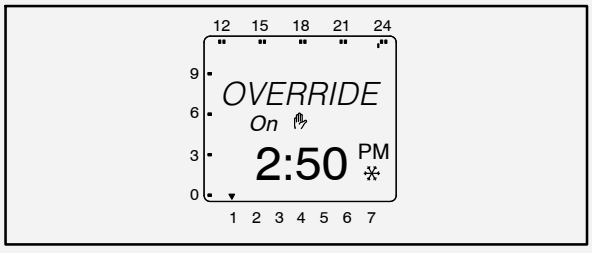
The control panel Load/No Load function can be set to test the generator set with or without load, as desired.

Initiating an Exercise

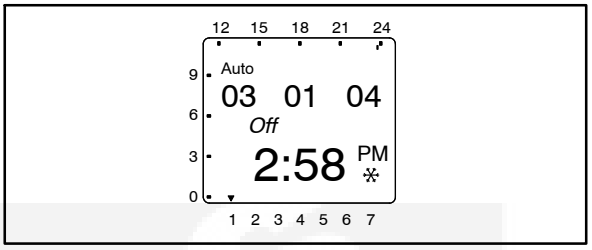
In the example shown below, "Off" indicates that no exercise is currently active.



1. With the Home menu displayed, simultaneously press the + and – buttons for approximately one second. "Override" and a hand symbol are displayed on the screen. In addition, "Off" is switched to "On" and the exercise is initiated.

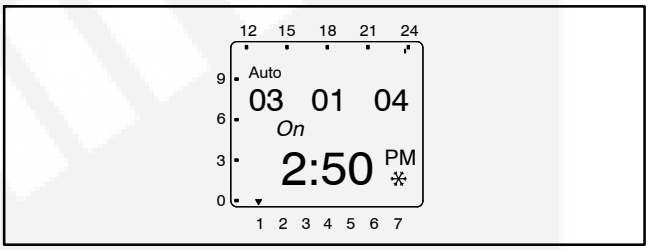


2. To end the exercise, simultaneously press the + and – buttons for approximately one second. The original Home menu is redisplayed and "On" is switched back to "Off."

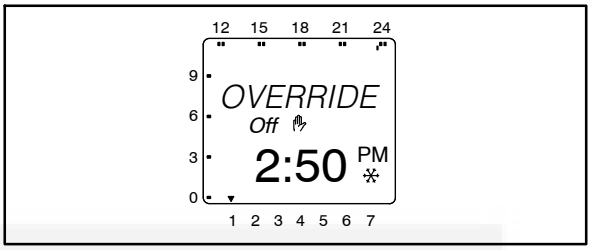


Overriding an Exercise

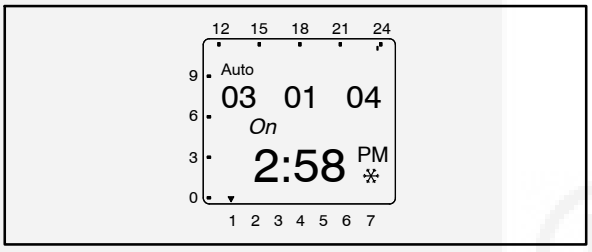
In the example shown below, "On" indicates that an exercise is currently active.



1. With the Home menu displayed, simultaneously press the + and – buttons for approximately one second. "Override" and a hand symbol are displayed on the screen. In addition, "On" is switched to "Off" and the exercise is stopped.



2. To restart the exercise, simultaneously press the + and – buttons for approximately one second. The original Home menu is redisplayed and "Off" is switched back to "On."

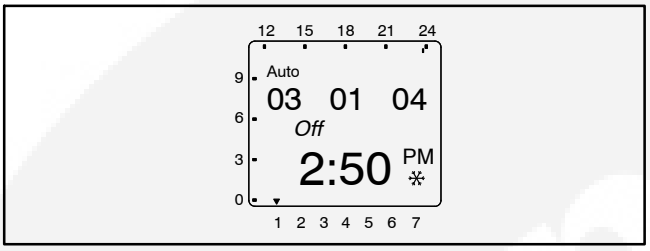


Selecting Permanent On/Off Mode

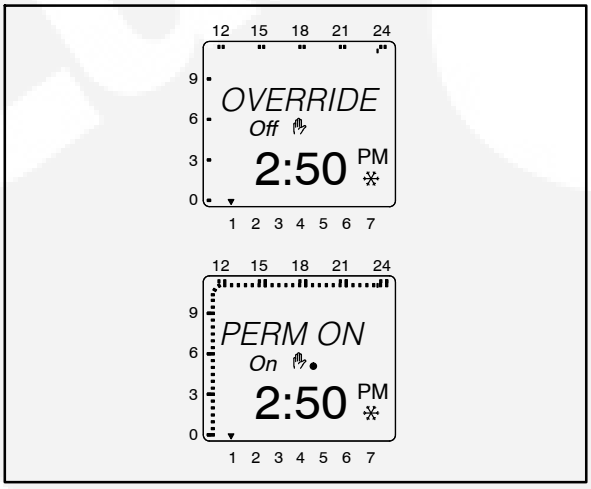
The exercise clock has a permanent on/off mode feature.

Selecting Permanent On/Off Mode Without an Active Exercise

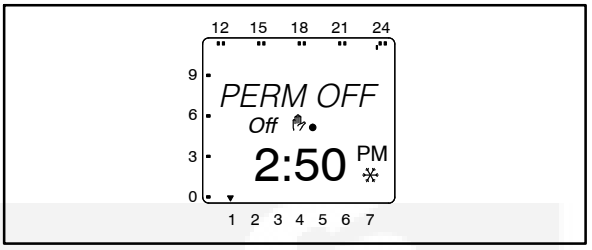
In the example shown below, “Off” indicates that no exercise is currently active.



1. With the Home menu displayed, simultaneously press the + and – buttons for approximately two seconds. The Override menu is first displayed and then the “Perm On” and the hand/dot symbols are displayed on the screen. In addition, a continuous band of segments is displayed on the left side and top of the screen and “Off” is switched to “On.”



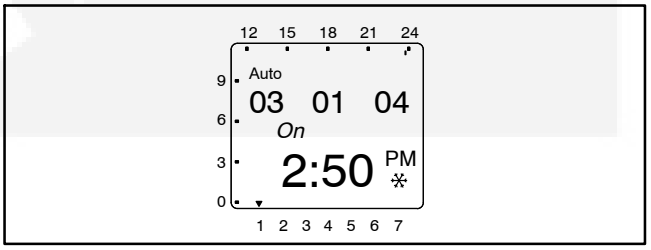
2. To switch to Permanent Off mode, press the + and – buttons for approximately two seconds. “Perm Off” is displayed and “On” is switched back to “Off.”



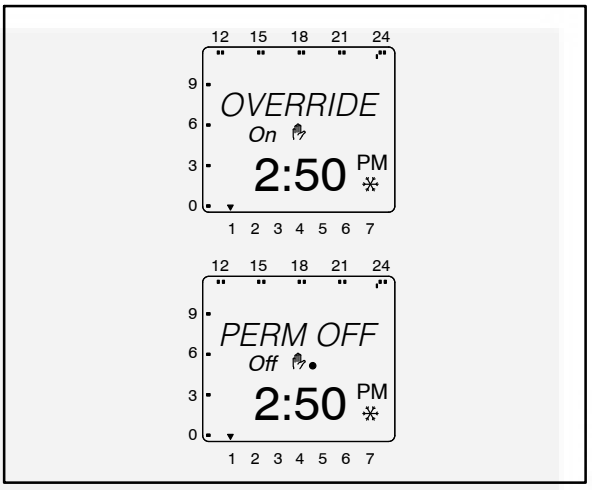
3. To return the clock to its original state, simultaneously press the + and – buttons for approximately one second. The original Home menu is redisplayed.

Selecting Permanent On/Off Mode With an Active Exercise

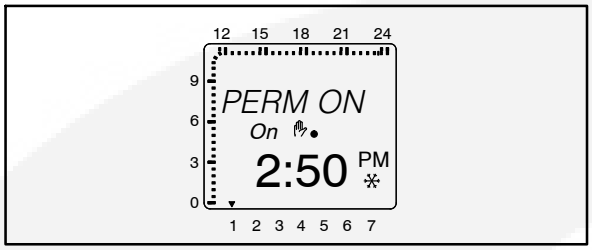
In the example shown below, “On” indicates that an exercise is currently active.



1. With the Home menu displayed, simultaneously press the + and – buttons for approximately two seconds. The Override menu is first displayed and then the “Perm Off” and the hand/dot symbols are displayed on the screen. In addition, “On” is switched to “Off.”



2. To switch to Permanent On mode, press the + and – buttons for approximately two seconds. “Perm On” is displayed and “Off” is switched back to “On.” In addition, a continuous band of segments is displayed on the left side and top of the screen.



3. To return the clock to its original state, simultaneously press the + and – buttons for approximately one second. The original Home menu is redisplayed.

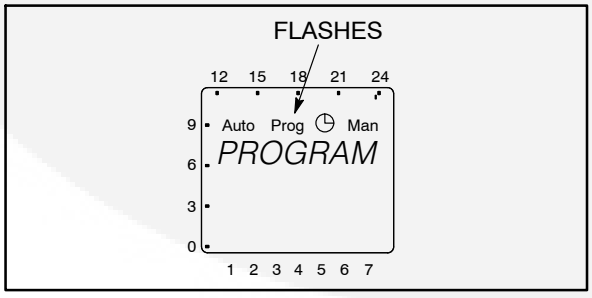
Adding A Security Code

A 4-digit security code number can be entered to prevent unauthorized personnel from using the clock.

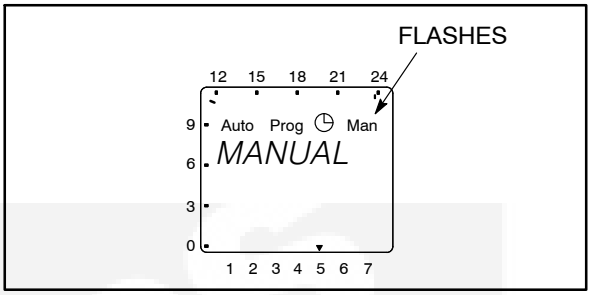
Once a security code has been set up, the exercise clock is locked 90 seconds after the last keystroke. It can only be operated again after the correct PIN code is entered.

⚠CAUTION ***Once a PIN code has been activated and the Reset button is pressed (see “Resetting the Timer” on the following page), the exercise timer can no longer be activated without a valid PIN code. The device must be replaced.***

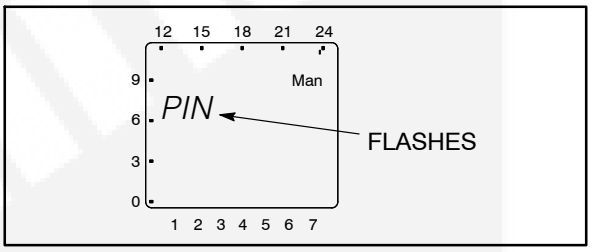
1. From the Home menu, press the **Menu** button. The Program menu is displayed.



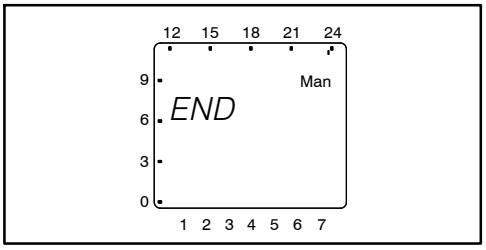
2. Press the + button twice. The Date/Time menu is displayed, followed by the Manual menu.



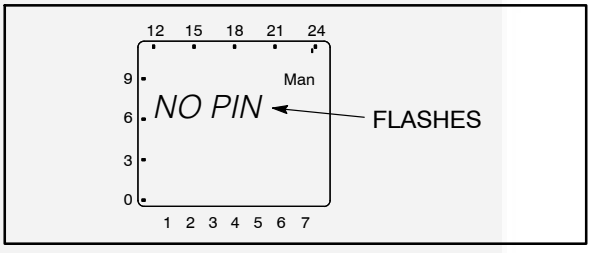
3. Press the **ok** button to display the Pin menu.



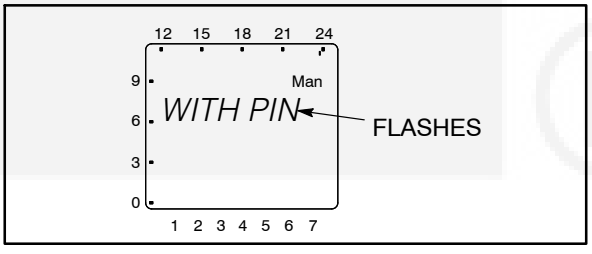
NOTE: If the + or – button is pressed now, the message “End” is displayed. Press the **ok** button to return to the Home menu.



4. Press the **ok** button to display the No PIN menu.

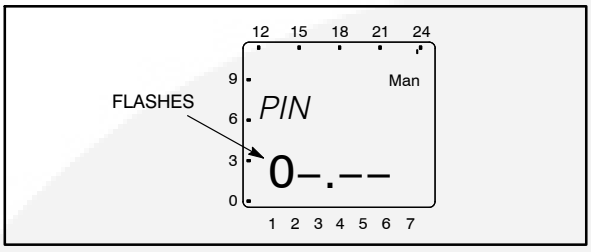


5. Press the + or – buttons to display the With PIN menu.



6. Press the **ok** button to display the PIN Number menu.

   NOTE: If you choose not to enter a 4-digit access code at this time, the only way to exit Manual mode is to press the reset (Res) button.



7. Press the + or – buttons to enter the first digit of your 4-digit access code.

8. Press the **ok** button. Then press the + or – buttons to enter the second digit of your 4-digit access code.

9. Repeat step 8 for the third and fourth digit of your 4-digit access code.

10. Press the **ok** button. The Home menu is then redisplayed.

After Programming the Exerciser Clock

1. Make sure the External Exercise function on the transfer switch control panel is set to “On.” For more information, see *Section 5*.

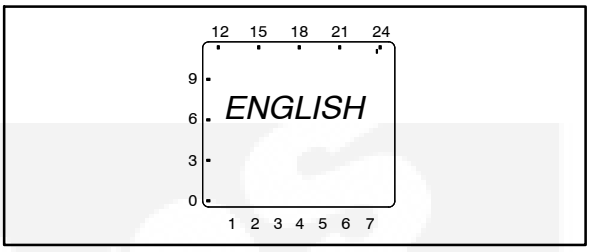
2. Place the generator set operation selector switch in the Remote position.

3. Check the system for proper operation as described in the Operator’s Manual.

Resetting the Timer

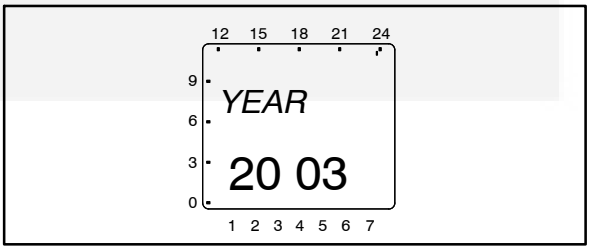
The Reset button should only be used in cases of an emergency. Resetting the timer erases all existing language, date, and time settings. Upon pressing the **Res** button, the clock is set to 12:00 midnight, Wednesday, January 1, 2003. However, **scheduled exercise periods remain intact**.

1. Use a pointed object to press the **Res** button for approximately one second. Two information screens are displayed and the default national language is flashed.

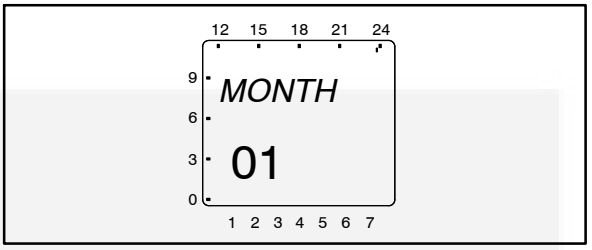


2. If the incorrect language is being displayed, use the + or – button to scroll through the available languages (English, Espanol, Francais, Portugal, Italiano, or Deutsch).

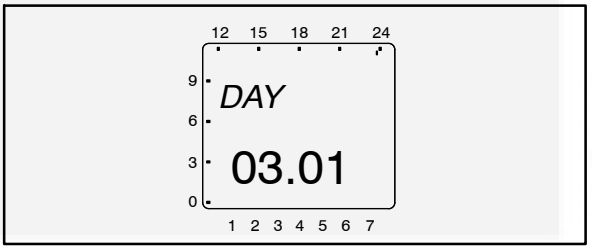
3. When the desired language is displayed, press the **ok** button. The year is displayed next.



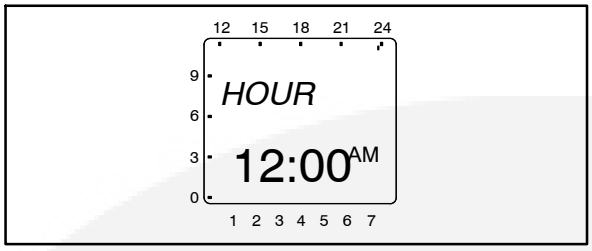
4. Press the + button until the correct year is displayed and then press the **ok** button. The month is displayed next.



5. Press the + or – button until the correct month is displayed and then press the **ok** button. The screen then shows the day value flashing.



6. Press the + or – button until the correct day is displayed. Press the **ok** button. The screen then shows the hour value flashing.



7. Press the + or – button until the correct hour is displayed. Press the **ok** button. The screen then shows the minute value flashing.

PLANNED MAINTENANCE

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

The following procedures must only be done by technically qualified personnel, according to procedures in the Service Manual (962-0524). 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 Service manual (962-0524).***

⚠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 generator set operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [–] lead first) 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, especially at meters, lamps, and switches.***

3. **Inspect**

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

   b. Check stationary and movable contacts. If contact replacement is necessary, contact your dealer or distributor.

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

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

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

   f. 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 *Service Manual (962-0524)*. Retorque all cable lug connections. Lug torque requirements are listed in *Section 1* of the Service manual.

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

   a. Connect the set starting battery (negative [–] lead last). Connect the utility AC power source, enable the generator set 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.

CIRCUIT BREAKER PLANNED MAINTENANCE

NOTE: The following information is used with permission from Schneider Electric (see the footnote at the bottom of the page).

Inspection and Preventative Maintenance

Molded case circuit breakers normally require very little maintenance. The Company recommends that inspection procedures be performed on a regular basis. Inspection frequency depends on operating and environmental conditions associated with the application. Visual inspections as indicated in steps 1, 2, 4, and 7 under "Procedures" can be performed any time electrical workers or maintenance personnel are in the vicinity of the electrical equipment. Other inspections can be done during normal maintenance intervals. It is recommended that the circuit breaker mechanism be exercised annually as explained in step 5. Inspection and maintenance may be required more frequently if adverse operating or environmental conditions exist.

Guidelines

The molded case of a Square D molded case circuit breaker should not be opened. Opening the case or disassembling the circuit breaker voids the manufacturer's warranty and compromises the integrity of the device. Opened or otherwise inoperable circuit breakers should be destroyed or returned to the Company to prevent them from being returned to service. Removal of auxiliary or accessory covers does not constitute opening the molded case.

Procedures

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Take precautions to ensure that no accidental contact is made with live components during this check.

Failure to follow this instruction will result in death or serious injury.

1. Verify circuit breaker application and rating.

   Make sure that the circuit breaker is properly applied within labeled voltage, ampere rating, maximum current interrupting ratings and to Company recommendations. Compare the circuit breaker faceplate data to the installation drawings. Verify trip unit settings on Micrologic® electronic-trip circuit breakers with the coordination study. After completing inspection and maintenance procedures, insure that all trip unit settings for all functions are set according to the coordination study.

2. Check for overheating while equipment is energized.

   While the circuit breaker is normally operating, under load and at operating temperature, check the exposed, accessible, insulated face of the circuit breaker and adjacent dead front

surfaces of the enclosure for overheating. To do this, place the palm of you hand on the outside of the enclosure. If you cannot maintain a three-second contact with the circuit breaker face, the cause should be investigated.

Allow initially energized circuit breaker at least three hours to reach operating temperature. Compare the surface temperature of individual circuit breakers with the surface temperature of other circuit breakers in the installation. Circuit breaker surface temperatures vary according to loading, position in the panelboard and ambient temperature. If the surface temperature of a circuit breaker is considerably higher than adjacent circuit breakers, the cause should be investigated.

Thermographic inspection methods may also be used to evaluate overheating with equipment energized (see “Thermographic Inspection” on page 4-47).

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Disconnect all power sources before performing steps 3 through 7. Assume that all circuits are live until they are completely de-energized, tested, grounded and tagged. Consider all sources of power, including the possibility of backfeeding and control power.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment. Failure to follow these precautions will result in serious injury or death.

Failure to follow this instruction will result in death or serious injury.

3. Check for overheating while the equipment is de-energized.

Visually inspect electrical components for discoloration. This may indicate overheating. If there is no evidence of overheating or loose connections, do not disturb or retorque connections.

Copper Connections:

If evidence of overheating is found on terminals, connectors, conductors or conductor insulation, clean and dress all affected connections and bus bars to NEMA Standards Publication AB4.

Aluminum Connections:

Overheated aluminum connectors must be replaced and damaged portions of the conductor removed. If the conductor is not long enough to properly terminate the circuit breaker when the damaged portion is removed, make an appropriate splice using a new length of rated conductor.

I-Line® Panelboard Connections:

If the I-Line panelboard jaw connections are pitted, discolored or deformed, the circuit breaker must be replaced. I-Line jaws are gauged and tested during the manufacturing process. They are not field replaceable. Do not bend or adjust them.

If electrical joint compound is removed from I-Line connections, it must be reapplied before reinstallation of the circuit breaker(s). This compound is necessary to ensure the integrity of the connection. I-Line panelboard connections require Square D PJC-7201 joint compound.

Drawout Connections:

If the electrical joint compound is removed from drawout connections, it must be reapplied before reinstallation of the circuit breakers. This compound is necessary to ensure the integrity of the connection. Drawout connections for SE circuit breakers require Square D PJC-8311 joint compound. Drawout connections for Masterpact® NW circuit breakers require S48899 grease.

After cleaning and/or replacing damaged parts, torque all connections to values specified by Square D. Refer to Square D

Class 601 and Class 602 catalogs for additional information regarding torque values.

4. Check for cracks in the molded case.

   Any circuit breaker with a cracked molded case should be replaced because its ability to withstand short-circuit interruption stresses is reduced.

5. Exercise circuit breaker mechanism.

   Toggle the circuit breaker handle on and off several times to ensure that mechanical linkages are free. Trip the circuit breaker with the push-to-trip button. Reset and turn the circuit breaker back on. Repeat to ensure operability. If the circuit breaker does not trip, or if it does not reset after tripping, it must be replaced.

6. Clean the circuit breaker.

   Remove any buildup of dust, dirt, grease or moisture from circuit breaker surfaces with a lint-free dry cloth or vacuum cleaner. Do not use compressed air. Use caution when using detergent-based cleaners or solvents: these may deteriorate faceplate, labels, and insulation materials. Clean contact surfaces of circuit breaker terminals and terminal pads or bus bars with a nonabrasive cleaner. Abrasive cleaners will remove plating, resulting in joint deterioration.

   If electrical joint compound is removed from I-Line or drawout connections, Square D PJC-7201 or PJC-8311 joint compound, respectively, must be reapplied before reinstalling the circuit breakers. This compound is necessary to ensure the integrity of the connection.

7. Inspect the enclosure.

   The enclosure should be clean and dry. All covers and trip pieces should be in place.

Thermographic Inspection

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Only qualified electrical workers with training and experience on low-voltage circuits should perform thermographic inspections. These workers must understand the hazards involved in working with or near low-voltage equipment. Perform such work only after reading this complete set of instructions.

Failure to follow this instruction will result in death or serious injury.

Infrared thermographic inspection techniques may be useful in evaluating the operating condition of circuit breakers and terminations. Comparison to stored infrared thermographic images may be useful for the preventive maintenance of circuit breakers and end-use equipment. The actual amount of heat emitted is a function of both load current and ambient conditions. Interpretation of infrared survey requires experience and training in this type of inspection.

Allow initially energized circuit breakers at least three hours to reach operating temperature. Compare the thermographic images of individual circuit breakers to previously stored images of the same circuit breakers.

5. Control Panel Configuration

The control panel can be used to configure ATS functions. When in **Configuration Mode**, the value code for the various control functions can be modified.

The control panel has a series of eight LEDs that display codes that indicate various control functions that can be configured. The first five LEDs display the function code and the last three LEDs display the value code for the displayed function (see Figure 5-1). A listing of the control functions (including the function and value codes) is included in Table 5-1. Additional information on these functions is included in *Section 4*.

With the exception of the Test LED, the function and value LEDs are not lit during automatic operation (**Automatic Mode**).

ACCESSING THE FRONT PANEL CONFIGURATION EDITOR

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

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

Configuration Mode is selected by operation of a small slide switch located on the back of the control panel. The switch is located near the bottom edge of the PCB (see Figure 5-2). The switch is partially hidden to prevent accidental operation.

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

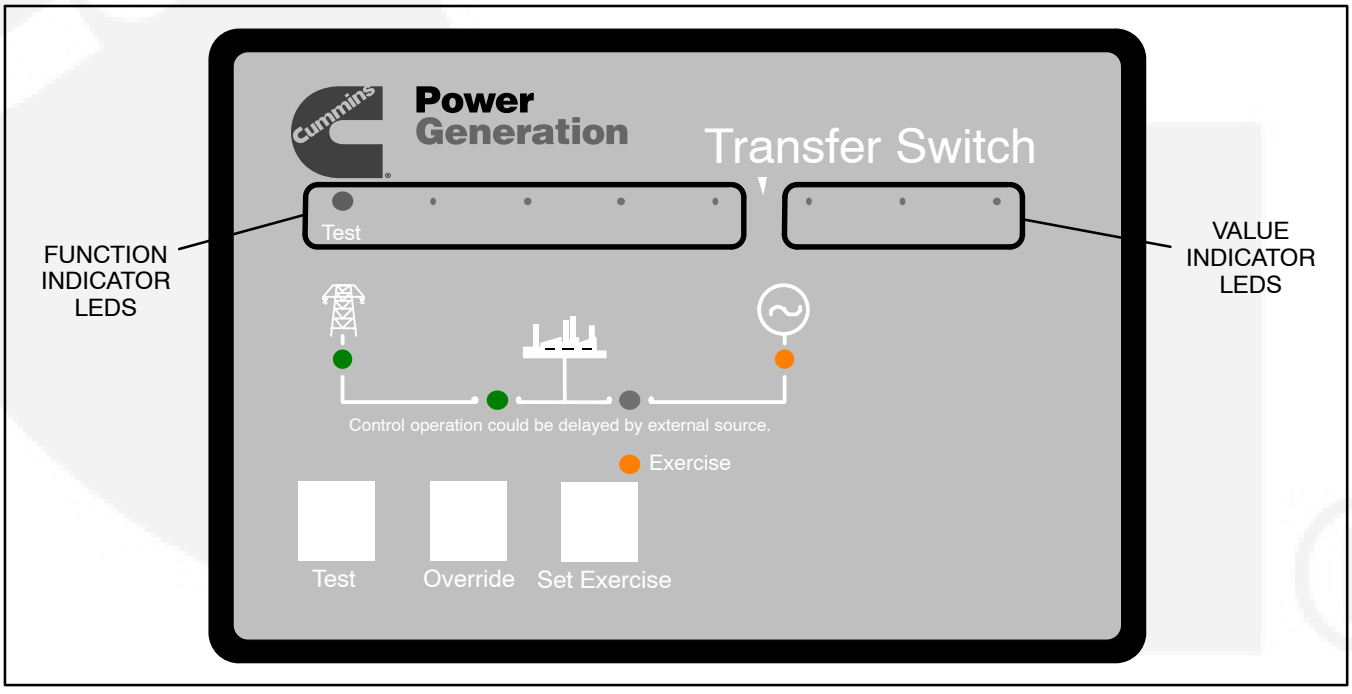


FIGURE 5-1. CONTROL PANEL

TABLE 5-1. ADJUSTABLE TRANSFER SWITCH FUNCTIONS

FUNCTION	FUNCTION CODE	VALUE CODE	VALUE (Default in bold italics)	Pg Ref
Not Available	○ ○ ○ ○ ○	NA NA NA		
TDES (Time Delay Engine Start)	○ ○ ○ ○ ●	○ ○ ○	0 Seconds (Disabled)	4-1
		○ ○ ●	0.5 Second	
		○ ● ○	1 Second	
		○ ● ●	2 Seconds	
		● ○ ○	***3 Seconds***	
		● ○ ●	4 Seconds	
		● ● ○	6 Seconds	
		● ● ●	10 Seconds	
TDNE (Time Delay Normal to Emergency)	○ ○ ○ ● ○	○ ○ ○	0 Seconds (Disabled)	4-1
		○ ○ ●	1 Second	
		○ ● ○	2 Seconds	
		○ ● ●	3 Seconds	
		● ○ ○	***5 Seconds***	
		● ○ ●	30 Seconds	
		● ● ○	120 Seconds	
		● ● ●	300 Seconds	
TDEN (Time Delay Emergency to Normal)	○ ○ ○ ● ●	○ ○ ○	0 Minutes (Disabled)	4-1
		○ ○ ●	0.1 Minutes (For Testing)	
		○ ● ○	5 Minutes	
		○ ● ●	***10 Minutes***	
		● ○ ○	15 Minutes	
		● ○ ●	20 Minutes	
		● ● ○	25 Minutes	
		● ● ●	30 Minutes	
TDEC (Time Delay Engine Cooldown)	○ ○ ● ○ ○	○ ○ ○	0 Minutes (Disabled)	4-1
		○ ○ ●	0.1 Minutes (For Testing)	
		○ ● ○	5 Minutes	
		○ ● ●	***10 Minutes***	
		● ○ ○	15 Minutes	
		● ○ ●	20 Minutes	
		● ● ○	25 Minutes	
		● ● ●	30 Minutes	
TDPT (Time Delay Program Transition)	○ ○ ● ○ ●	○ ○ ○	***0 Seconds (Disabled)***	4-2
		○ ○ ●	0.5 Second	
		○ ● ○	1 Second	
		○ ● ●	2 Seconds	
		● ○ ○	3 Seconds	
		● ○ ●	4 Seconds	
		● ● ○	6 Seconds	
		● ● ●	10 Seconds	

TABLE 5-1. ADJUSTABLE TRANSFER SWITCH FUNCTIONS (CONT.)

FUNCTION	FUNCTION CODE	VALUE CODE	VALUE (Default in bold italics)	Pg Ref
TDEL (Time Delay Elevator Signal)	○ ○ ● ● ○	○ ○ ○	***0 Seconds (Disabled)***	4-2
		○ ○ ●	1 Second	
		○ ● ○	2 Seconds	
		○ ● ●	3 Seconds	
		● ○ ○	5 Seconds	
		● ○ ●	30 Seconds	
		● ● ○	120 Seconds	
		● ● ●	300 Seconds	
Test With/Without Load	○ ○ ● ● ●	○ ○ ○	***Without Load***	4-5
		○ ○ ●	With Load	
External Exercise On/Off	○ ● ○ ○ ○	○ ○ ○	Off	NO TAG
		○ ○ ●	On	
Exercise With/Without Load	○ ● ○ ○ ●	○ ○ ○	***Without Load***	
		○ ○ ●	With Load	
System Nominal Voltage Table Selection	○ ● ○ ● ○	○ ○ ○	Table 1 ↓	
		○ ○ ●	Table 2 ↓	
System Nominal Voltage	○ ● ○ ● ●	○ ○ ○	115 / 400	
		○ ○ ●	120 / 415	
		○ ● ○	190 / 440	
		○ ● ●	208 / 460	
		● ○ ○	220 / 480	
		● ○ ●	230 / 550	
		● ● ○	240 / 575	
		● ● ●	380 / 600	
System Nominal Frequency 50/60 Hz	○ ● ● ○ ○	○ ○ ○	60 Hz	
		○ ○ ●	50 Hz	
Single Phase/Three Phase	○ ● ● ○ ●	○ ○ ○	Three Phase	
		○ ○ ●	Single Phase	
Utility Undervoltage Pickup	○ ● ● ● ○	○ ○ ○	***90%***	4-7
		○ ○ ●	95%	
Utility Undervoltage Dropout	○ ● ● ● ●	○ ○ ○	90%	4-7
		○ ○ ●	***85%***	
		○ ● ○	80%	
		○ ● ●	70%	
Phase Check On/Off	● ○ ○ ○ ○	○ ○ ○	***Off***	4-7
		○ ○ ●	On	
Return to Programmed Transition On/Off	● ○ ○ ○ ●	○ ○ ○	***Off***	4-7
		○ ○ ●	On	
Elevator Post Transfer Delay On/Off	● ○ ○ ● ○	○ ○ ○	***Off***	4-2
		○ ○ ●	On	
Exercise Repeat Interval	● ○ ○ ● ●	○ ○ ○	***Every 7 Days***	4-8
		○ ○ ●	Every 14 Days	
		○ ● ○	Every 21 Days	
		○ ● ●	Every 28 Days	

= THESE CONTROL FUNCTIONS ARE SET AT THE FACTORY AND SHOULD NOT REQUIRE ADJUSTING.

MODIFYING THE CONFIGURATION

The control has been configured at the factory and does not require additional adjustments (default settings are shown in bold italics in Table 5-1). However, you may wish to adjust some of the settings for better performance.

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

1. Slide the selector switch to the **Configuration Mode** position, as described on page 5-1. TDES is always the first function shown when entering Configuration Mode.
2. Press the **Test** pushbutton to scroll through the various control function codes displayed with the first five LEDs (see Table 5-1). The black-filled circles indicate which LEDs are lit for the function and value codes listed.
3. Once the desired function is selected, press the **Override** pushbutton to change the associated value code displayed with the last three LEDs.
4. When configuration is completed, return the selector switch back to the **Automatic Mode** position.

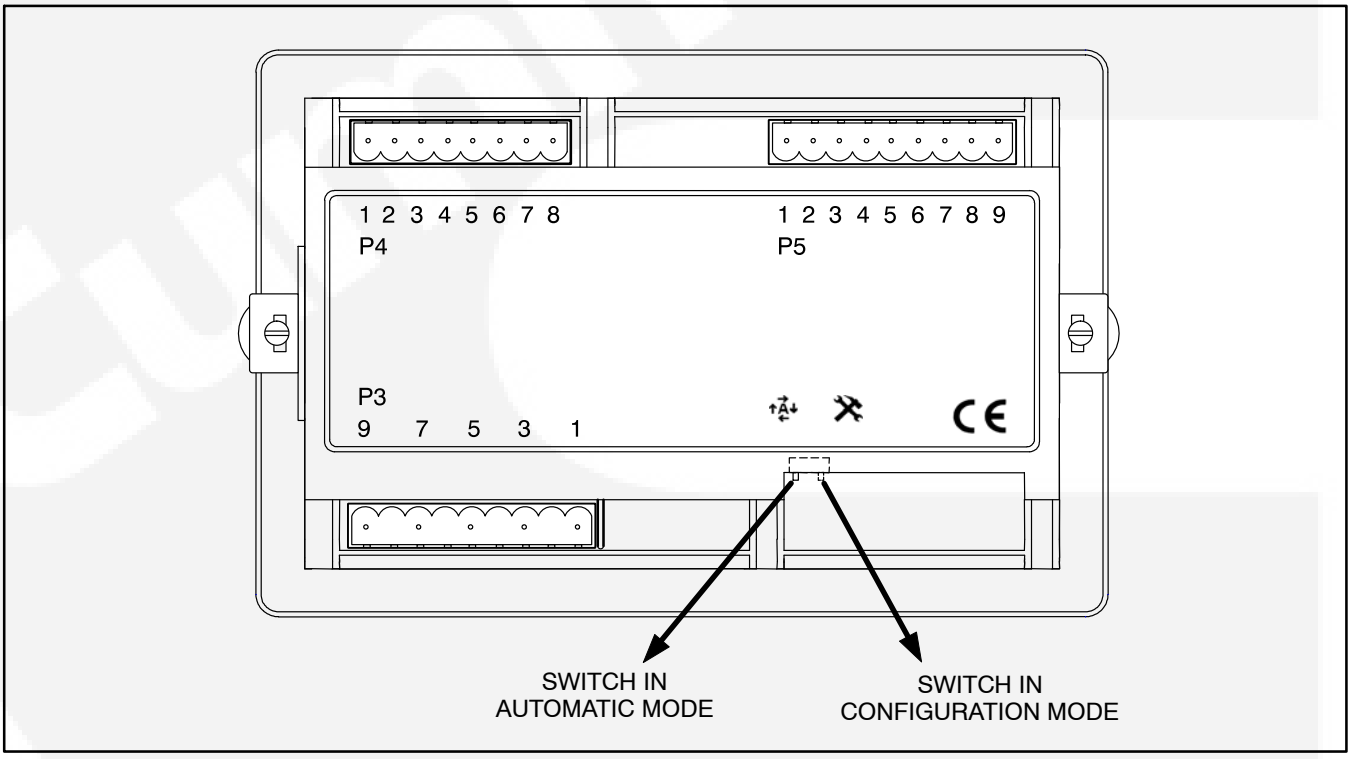


FIGURE 5-2. NORMAL/CONFIGURATION MODE SELECTOR SWITCH

6. Troubleshooting

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

CONTROL PANEL INDICATORS

The control panel contains six LED indicators that provide some information about the current control status and may be helpful in troubleshooting the transfer switch (see Figure 6-1). Descriptions of these indicators are included in Table 6-1.

TROUBLESHOOTING

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

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

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

Several of the steps listed on the following pages include checking on the control panel settings. To check the control settings, open the transfer switch door and slide the selector switch on the back on the control panel to the Configuration Mode position. Additional information on configuring the control panel is included in *Section 5*.

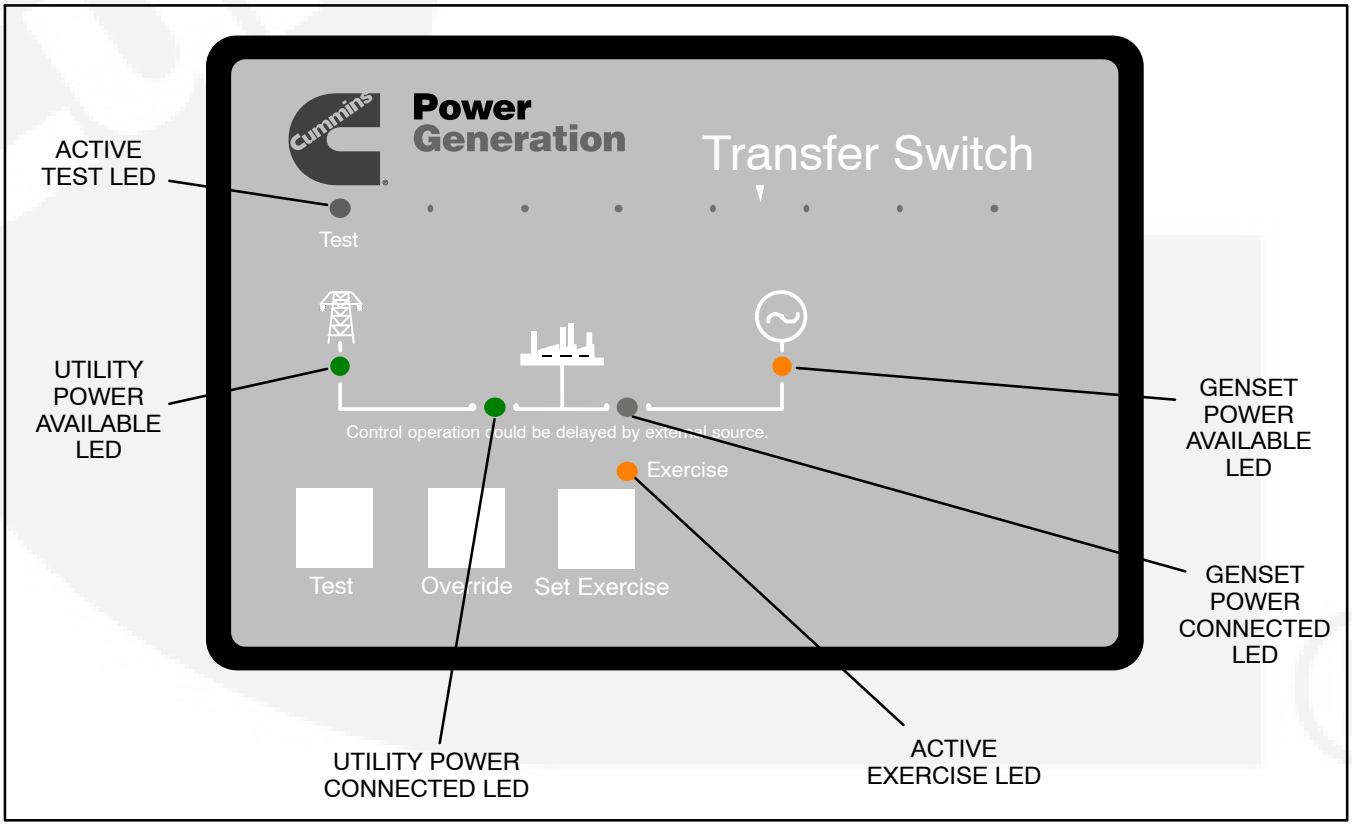


FIGURE 6-1. CONTROL PANEL

TABLE 6-1. CONTROL PANEL LED INDICATORS

Indicator	Definition
Utility (Normal) Power Available	This indicator lights when the utility source voltage sensor has determined that Utility power is available and is within acceptable voltage limits.
Utility (Normal) Power Connected	1. Lights constantly when the transfer switch is connected to Utility Power. 2. Blinks twice per second when the transfer switch has failed to connect to or disconnect from Utility Power when commanded. 3. Is off when the transfer switch is not connected to Utility Power.
Genset (Emergency) Power Available	This indicator lights when the generator source voltage sensor has determined that generator power is within acceptable voltage and frequency limits.
Genset (Emergency) Power Connected	1. Lights constantly when the transfer switch is connected to Generator Set Power. 2. Blinks twice per second when the transfer switch has failed to connect to or disconnect from Generator Set Power when commanded. 3. Is off when the transfer switch is not connected to Generator Power.
Exerciser Enabled	The following describes the Exercise Enabled LED when an exercise is enabled. 1. Lights constantly when integrated repeat exercise periods have been set. 2. Blinks twice per second when the Set Exercise button is pressed and held to set or cancel an integrated exercise period. 3. Blinks once per second when an integrated or external exercise period is active. 4. Is off when no integrated repeat exercise periods are set.
Active Test	1. This indicator blinks at two times per second rate during the two seconds that the Test button is pressed to acknowledge that a test has been activated or when the remote test input is grounded. 2. The indicator lights constantly during the test and goes out once the test is completed or normal power has failed.

Power Outage Occurs, But 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. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.***

1. Verify that the operation selector switch on the generator set control panel is set to the Remote position. 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. If the problem persists, call your dealer or distributor.

⚠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.***

Generator Set Starts During Normal Power Service

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

1. Verify that the operation selector switch on the generator set control panel is set to the Remote position.

2. Check the Utility Power Available LED on the control panel to see if it is lit.

   If the Utility Power Available LED is lit,

   a. Check the Active Exercise LED to see if it is in an exercise period.

   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.

   b. Momentary voltage dips might cause voltage sensors to initiate generator set starting. Check the utility undervoltage parameter settings on the control panel. Increase the TDES setting.

   If the Utility Power Available LED is not lit,

   a. Verify that the breaker is On and not "tripped."

   b. Check the control setting to verify that the system nominal voltage matches what is listed on the nameplate.

   c. Check the control setting to verify that the system frequency matches what is listed on the nameplate.

   d. Check the control setting to verify that the system phase setting matches what is listed on the nameplate.

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

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

Generator Set Does Not Exercise

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

1. Verify that the operation selector switch on the generator set control panel is set to the Remote position.

2. If the optional external exerciser is installed, verify that the External Exercise function has been set to On.

3. Check the Exercise LED on the control panel to see if it is lit.

   a. If the Exercise LED is not lit, no exercise period has been set. Refer to the exerciser programming procedure for information on setting an exercise.

   b. If the Exercise LED is lit but not flashing, the exercise period has not yet started. Integrated exercisers do not display exercise start and stop times. If the optional external exerciser is enabled, check the exercise clock to see when an exercise is scheduled.

4. 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 switch or equipment, or other possible source of ignition near the fuel system.***

5. If the problem persists, call your dealer or distributor.

After a Power Failure, the Generator Set Starts But Does Not Assume the Load

⚠WARNING ***AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. 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 Genset Power Available LED on the control panel is lit.

   If the Genset Power Available LED is not lit,

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

   b. Check the control setting to verify that the system nominal voltage matches what is listed on the nameplate.

   c. Check the control setting to verify that the system frequency matches what is listed on the nameplate.

   d. Check the control setting to verify that the system phase setting matches what is listed on the nameplate.

   If the Genset Power Available LED is lit,

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

FUNCTION CODE FOR TDNE	VALUE CODE	VALUE (Default in bold italics)
○ ○ ○ ● ○	○ ○ ○	0 Seconds (Disabled)
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	***5 Seconds***
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

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

2. If the problem persists, call your dealer or distributor.

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

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

   If the Utility Power Available LED is lit,

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

FUNCTION CODE FOR TDEN	VALUE CODE	VALUE (Default in bold italics)
○ ○ ○ ● ●	○ ○ ○	0 Minutes (Disabled)
	○ ○ ●	0.1 Minutes
	○ ● ○	5 Minutes
	○ ● ●	***10 Minutes***
	● ○ ○	15 Minutes
	● ○ ●	20 Minutes
	● ● ○	25 Minutes
	● ● ●	30 Minutes

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

   c. There may be an active TDEL. Wait until the time delay has expired. The TDEL can be set for up to 300 seconds.

FUNCTION CODE FOR TDEL	VALUE CODE	VALUE (Default in bold italics)
○ ○ ● ● ○	○ ○ ○	***0 Seconds (Disabled)***
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	5 Seconds
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

   d. A phase check may be enabled. When the phase check function is enabled, the utility does not assume the load until both sources are within acceptable limits of the phase check sensor.

If the Utility Power Available LED is not lit,

a. Verify that the breaker is in the On position and not "tripped." If tripped, move the circuit breaker handle to the Off position and then to the On position.

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

2. If the problem persists, call your dealer or distributor.

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

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

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

FUNCTION CODE FOR TDEC	VALUE CODE	VALUE (Default in bold italics)
○ ○ ● ○ ○	○ ○ ○	0 Minutes (Disabled)
	○ ○ ●	0.1 Minutes
	○ ● ○	5 Minutes
	○ ● ●	***10 Minutes***
	● ○ ○	15 Minutes
	● ○ ●	20 Minutes
	● ● ○	25 Minutes
	● ● ●	30 Minutes

2. Stop the generator set with its Start/Stop switch. Call your dealer or distributor.

System Does Not Test With Load

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

1. Check the control setting to verify that the Test With/Without Load function has been set to With Load.

2. If the control has been set to Test With Load,

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

FUNCTION CODE FOR TDNE	VALUE CODE	VALUE (Default in bold italics)
○ ○ ○ ● ○	○ ○ ○	0 Seconds (Disabled)
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	***5 Seconds***
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

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

c. There may be an active TDEL. Wait until the time delay has expired. The TDEL can be set for up to 300 seconds.

FUNCTION CODE FOR TDEL	VALUE CODE	VALUE (Default in bold italics)
○ ○ ● ● ○	○ ○ ○	***0 Seconds (Disabled)***
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	5 Seconds
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

d. A phase check may be enabled. When the phase check function is enabled, the generator set does not assume the load until both sources are within acceptable limits of the phase check sensor.

System Does Not Exercise With Load

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

1. Check the control setting to verify that the Exercise With/Without Load function has been set to With Load.

2. If the control has been set to Exercise With Load,

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

FUNCTION CODE FOR TDNE	VALUE CODE	VALUE (Default in bold italics)
○ ○ ○ ● ○	○ ○ ○	0 Seconds (Disabled)
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	***5 Seconds***
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

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

   c. There may be an active TDEL. Wait until the time delay has expired. The TDEL can be set for up to 300 seconds.

FUNCTION CODE FOR TDEL	VALUE CODE	VALUE (Default in bold italics)
○ ○ ● ● ○	○ ○ ○	***0 Seconds (Disabled)***
	○ ○ ●	1 Second
	○ ● ○	2 Seconds
	○ ● ●	3 Seconds
	● ○ ○	5 Seconds
	● ○ ●	30 Seconds
	● ● ○	120 Seconds
	● ● ●	300 Seconds

   d. A phase check may be enabled. When the phase check function is enabled, the generator set does not assume the load until both sources are within acceptable limits of the phase check sensor.

External Exercise Clock Does Not Start An Exercise

⚠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 the control setting to verify that the External Exercise function has been set to On.

2. Check the exercise program to see if exercise periods have been set up.

3. Check the exercise program to verify that both start and stop times for the exercise period have been set up. The exercise will not start if only the start time is set up.

External Exerciser Does Not Repeat an Exercise

Check the external exercise clock Permanent On/Off Mode setting. Exercises will not repeat if this feature is set to Off.

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.

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