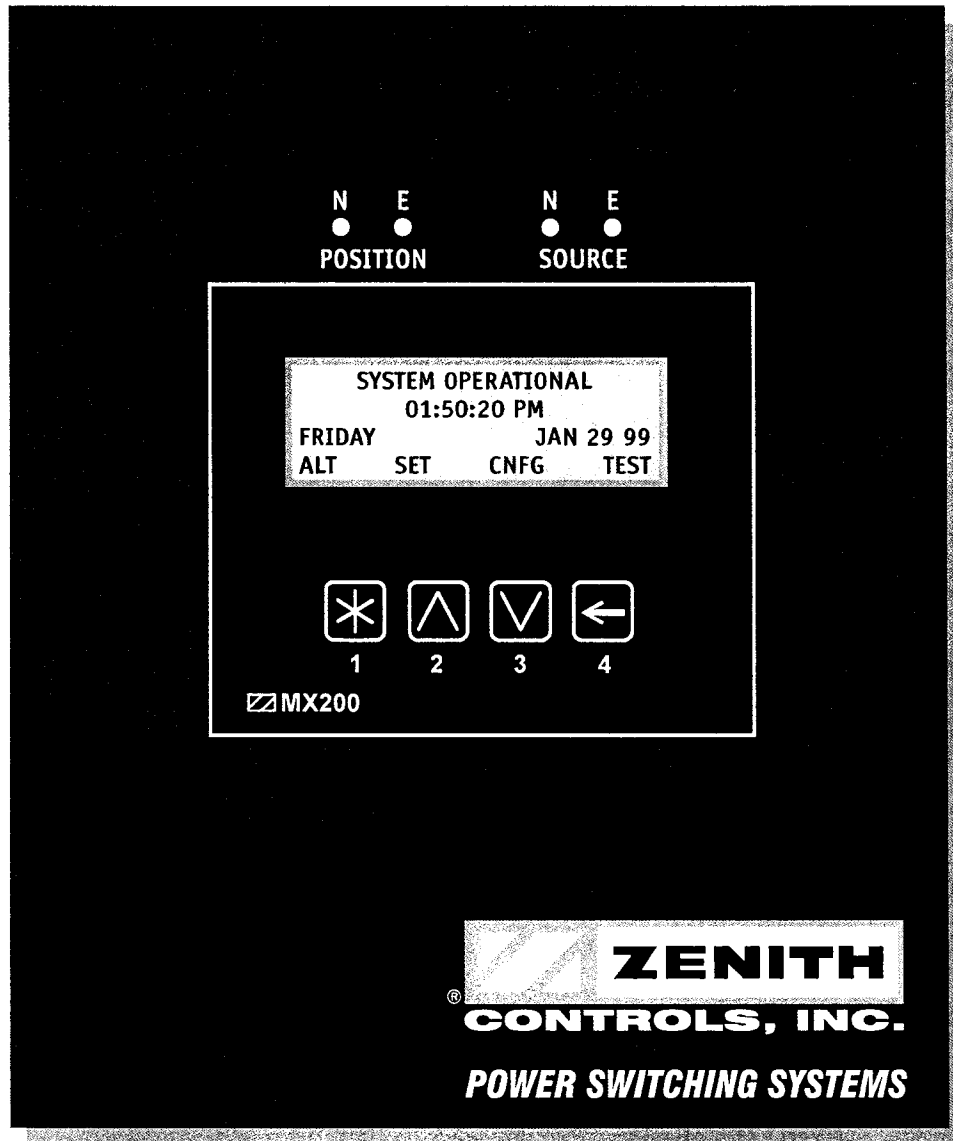

OPERATION AND MAINTENANCE MANUAL




TRANSFER SWITCH CONTROL PANEL


MX200 MICROPROCESSOR CONTROLLER



50R-2000C
12/98

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 = Quick Start

Safety

⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Installation for each ATS is detailed in the information package which includes:

- Operation and Maintenance Manual for Control Panel (this manual)
- Power Panel Manual
- Specific Schematics Supplied With Each Transfer Switch

Final Equipment Inspection

Prior to energizing the transfer switch:

1. Remove any debris incurred due to shipment or installation. **DO NOT** use a blower since debris may become lodged in the electrical and mechanical components and cause damage. Use of a vacuum is recommended.
2. Verify that all cabled connections are correct and that phase rotation of both sources match.
3. Check engine start connections and verify the correct connection of all control wires.
4. Check settings of all timers and adjust as necessary. Also adjust any optional accessories as required.
5. Check the integrity of power connections by verifying actual lug torque values as specified in the power panel manual.
6. Make sure that all covers and barriers are installed and properly fastened.

NOTE: Power Panels ship from Zenith in the Normal Position.

Equipment Inspection and Storage

Immediately inspect the transfer switch when received to detect any damage which may have occurred during transit. If damage is found or suspected, file claims as soon as possible with the carrier and notify the nearest Zenith representative.

Before installation, it is necessary to store the transfer switch in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation.

Storage Temperature: -30 C to + 85 C (-22 F to +149 F)

Operating Temperature (Ambient): -20 C to +75 C (-4 F to +167 F) [40-260 Amps]
-20 C to +60 C (-4 F to +104 F) [400-4000 Amps]

Humidity: 5% to 95% (non-condensing)

The MX200 Controller Overview

The MX200 CONTROLLER consists of two major assemblies:

I. The *Microprocessor* contains the following:

- A. Customer Input and Output (I/O) for system interface. Located on the left hand side of the back of the unit (see figure 1)
 - 1. I/O accessories that can be found here are:
 - a. Engine start relay P output
 - b. Source Availability A1 and A1E output (optional)
 - c. Pre-Signal to transfer T3, W3 and A6 output (optional)
 - d. Transfer Inhibit Q3 and Q7 input (optional)
 - e. Remote test Q2 input (optional)
 - f. Load shed R15 input (optional)
 - g. Network interface ZNET200 input/output (optional)

B. LCD and Keypad located on the exterior of the door (see figure 2)

- 1. User accessibility to the following:
 - a. LED indication of source availability
 - b. LED indication of transfer switch position
 - c. LCD screen indicates:
 - (1) timer count down (numeric)
 - (2) event reporting (text)
 - d. Keypad provides user interface to:
[in conjunction with LCD screen]
 - (1) Setting sensors and timers
 - (2) Configuring logic accessories

II. The *R/T box* (relay transformer box) contains the following: (see figure 1)

- A. Relays which are required for controller output to energize the transferring mechanism of the transfer switch at line voltage.

- B. Transformers which drop line voltage to control level for controller input.

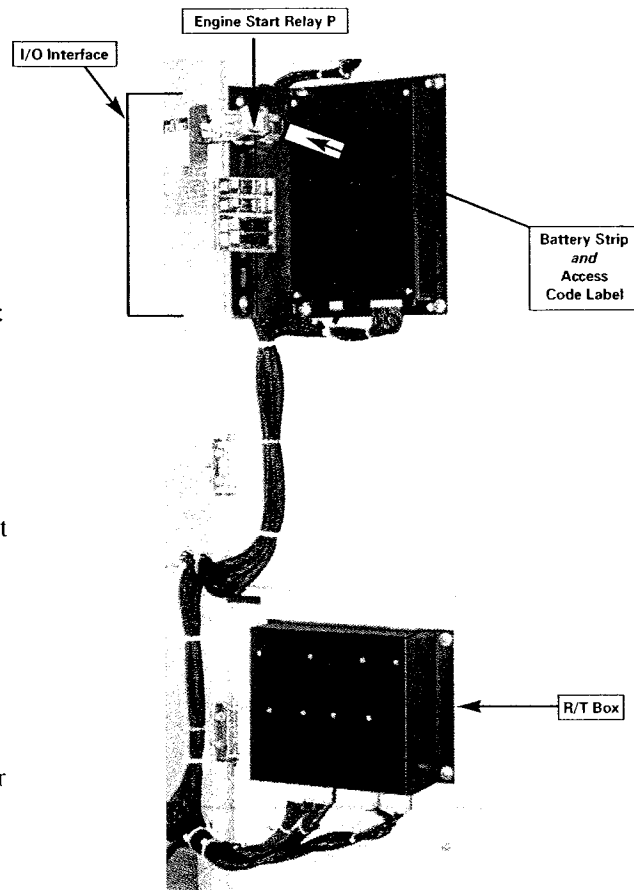


Figure 1

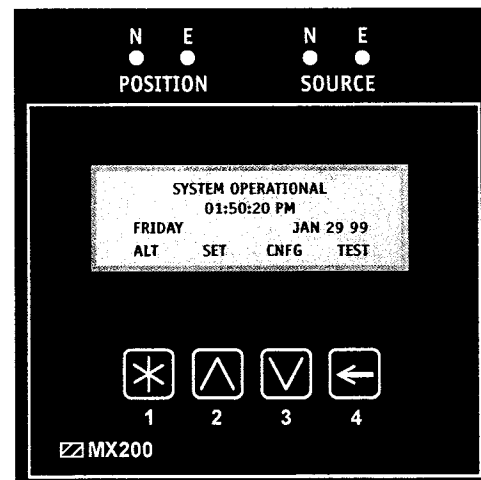


Figure 2

Installation

⚠ DANGER

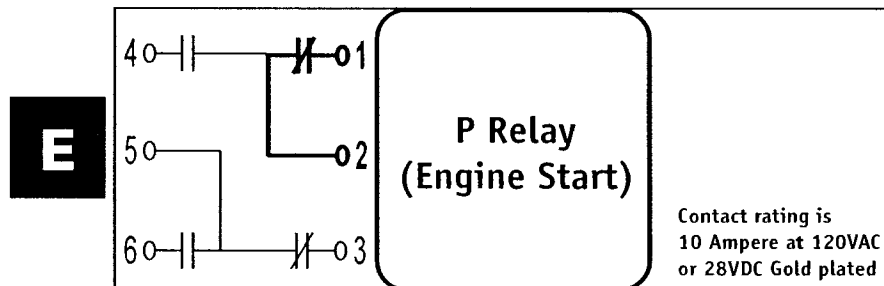
HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Connecting Engine Start may cause Generator to start. Before connecting, turn Generator OFF.

Engine Control Connections (E contacts)

Connections for Engine Control are located on the upper left side of the unit (see figure 1). The P relay provides this output. This contact is controlled by the P timer. To change response time to Normal power outage (see page 18 and 20).



The above diagram represents a de-energized P relay (utility shown de-energized). The majority of generator manufacturers require a contact closure to start Engine. Use terminals #1 and #2.

Note 1: Bypass Isolation Transfer Switches have an auxiliary Engine Start feature. This provides an Engine Start even if the ATS and controls are isolated (*THIS IS A STANDARD FEATURE EXCLUSIVELY ON ZENITH BYPASS PRODUCTS*). The Customer connections on these products are located on the Power Panel, upper right-hand corner. Please refer to the Power Panel instruction manual for complete details.

Note 2: Products equipped with Engine control options such as S1, S2 or P2 provide customer connections on an auxiliary terminal block located on the MX200 DIN rail or auxiliary control panel. Please refer to corresponding option drawing.

Installation - Optional Accessories

⚠ DANGER

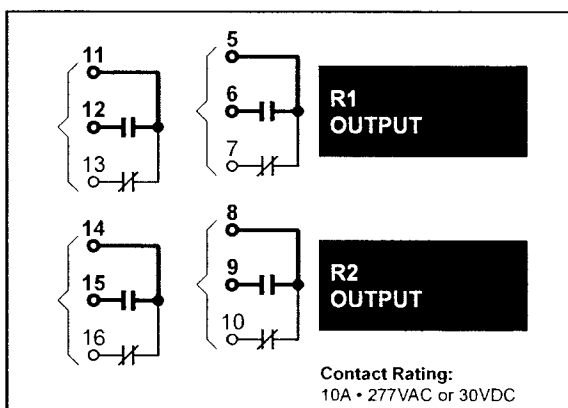
HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Generally the input and output options are located below the P relay on the same DIN rail (see figure 1). In some cases it may be necessary to mount additional accessories on an auxiliary panel.

Output Option Connections

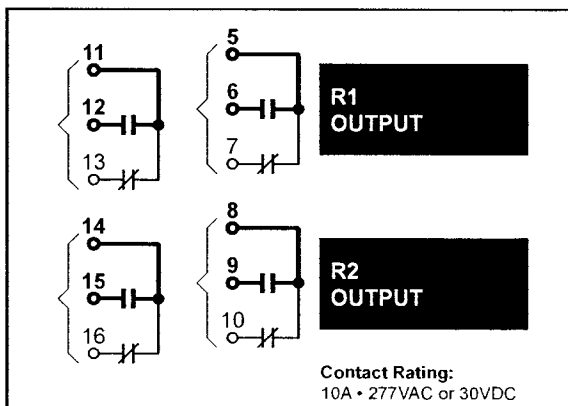
A1



Auxiliary contact(s) that operate(s) based on Normal source availability. Contacts located on R1 and/or R2. Refer to labeling.

Example: Terminal numbers 11 and 12 are closed when Normal source is acceptable (11 and 13 are open). When the Normal source is unacceptable, the opposite is true. Diagrams are shown with Normal unavailable.

A1E



Auxiliary contact(s) that operate(s) based on Emergency source availability. Contacts located on R1 and/or R2. Refer to labeling.

Example: Terminal numbers 11 and 12 are closed when Emergency source is acceptable (11 and 13 are open). When the Emergency source is unacceptable, the opposite is true. Diagrams are shown with Emergency unavailable.

Installation - Optional Accessories *(cont'd)*

⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

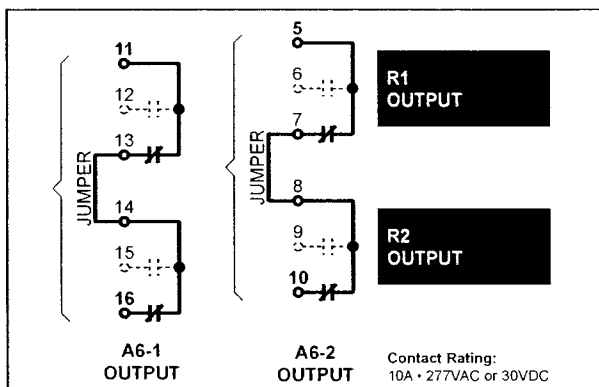
Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Output Option Connections *(cont'd)*

A3/A4

These connections are located on the Power Panel. Exact location depends upon which model is used. Refer to the Power Panel instruction manual for details. In all cases the A4 contact closes when the Transfer Switch is in the Normal position and the A3 contact closes when the Transfer Switch is in the Emergency position.

A6



Auxiliary contact(s) that open prior to transfer in either direction.

Example: Terminals 11 to 16 will open five* seconds prior to transfer in either direction and close instantaneously after transfer.

* Pre-signal time is adjustable via T3/W3 timers (see page 11, 19 and 20)

For complete sequence of operation, see page 19

Installation - Optional Accessories *(cont'd)*

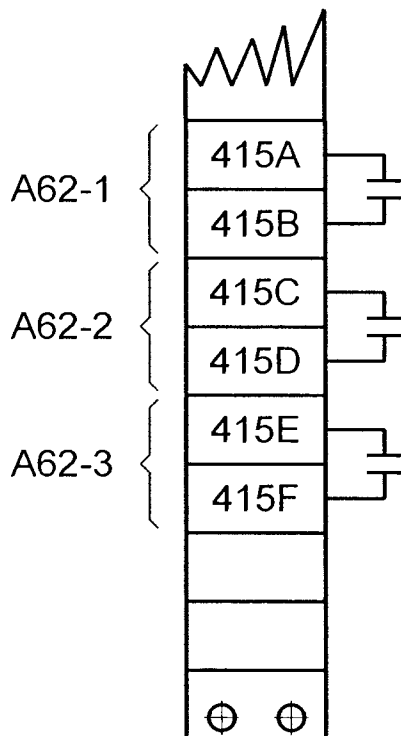
⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Output Option Connections *(cont'd)*

A62



Contact Ratings:
5A 250 VAC

Auxiliary contact(s) that open prior* to transfer in either direction and close in sequence** after transfer.

All A62 contacts will open five* seconds prior to transfer in either direction. Contacts close after transfer when their corresponding timers have timed out.

- A62-1 contact sequence timer is T62-1
- A62-2 contact sequence timer is T62-2
- A62-3 contact sequence timer is T62-3

Example: When all three sequence timers are set for 5 seconds:

- A62-1 closes 5 seconds after transfer and starts T62-2 timer
- A62-2 will close 10 seconds after transfer and then start the T62-3 timer
- A62-3 will then close 15 seconds after transfer and so on.

* pre-signal time is adjustable via T3/W3 timers (see page 11, 19 and 20)

** sequence timers are adjustable and located on the auxiliary panel

Installation - Optional Accessories *(cont'd)*

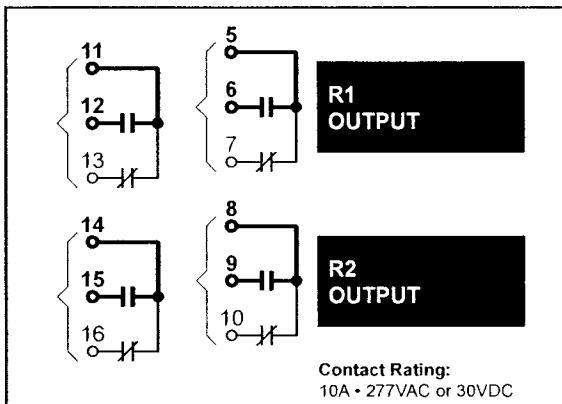
⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Output Option Connections *(cont'd)*

T3/W3



Auxiliary contacts that close five* seconds prior to transfer, and open instantaneously after transfer. Contacts located on R1 and/or R2. Refer to labeling.

- T3 is prior to transfer to Normal.
- W3 is prior to transfer to Emergency.
- T3/W3 is canceled when transfer is due to source outage.

*pre-signal time is adjustable (see page 11, 19 and 20)

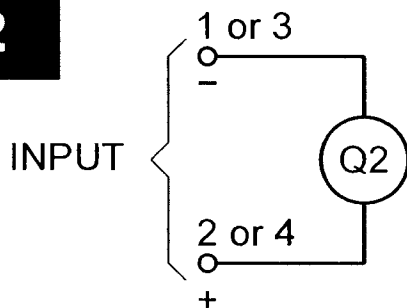
Installation - Optional Accessories *(cont'd)*

⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Input Options Connections

Q2

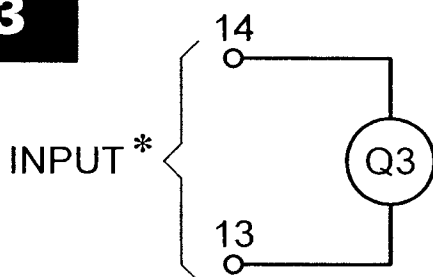
Remote Peak Shave or Area Protection Circuit

Energize Q2 input to simulate a Normal line failure causing the Generator to start and transfer the load to Emergency. Should Emergency fail during this operation, the Transfer Switch will retransfer back to Normal.

Q2 Input Modules:

K-1267, 120VAC INPUT (*Standard*)

K-1266, 24V (AC or DC) or 12VDC INPUT (*Optional*)

Q3

Remote Inhibit Transfer to Emergency Circuit

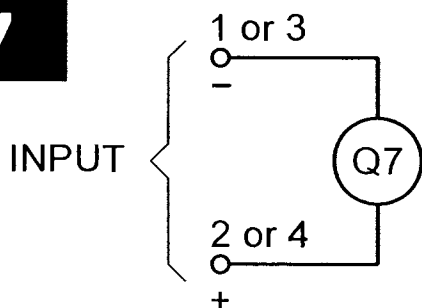
Voltage applied to Q3 input will allow transfer to Emergency. Conversely, no input on Q3 will inhibit transfer to Emergency.

* To enable Q3 option, engage Q3 jumper.

Q3 Relay:

K-1204, 120VAC (*Standard*)

K-1232, 24VAC; K-1242, 24VDC (*Optional*)

Q7

Remote Inhibit Transfer to Normal Circuit

Energize Q7 input to prevent transfer to Normal.

Q7 Input Modules:

K-1267, 120VAC INPUT (*Standard*)

K-1266, 24V (AC or DC) or 12VDC INPUT (*Optional*)

Installation - Optional Accessories *(cont'd)*

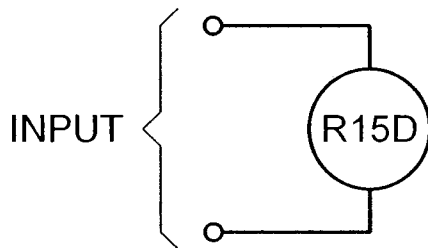
⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Input Options Connections *(cont'd)*

R15/R15D



Load Shed

Input, that when energized, causes the unit to transfer out of the Emergency position. The customer can use this to prevent generator overload.

On a *Standard* transfer switch, the R15 will transfer the unit to a dead Normal.

On a *Delay* transfer switch, the R15D will transfer the unit to a neutral (open) position. (Unit will transfer to Normal if acceptable)

Q3 is used to keep the unit from transferring back to Emergency.

R15/R15D Relay:

K-1204, 120VAC (*Standard*)

K-1232, 24VAC; K-1242, 24VDC (*Optional*)

Communication Connections

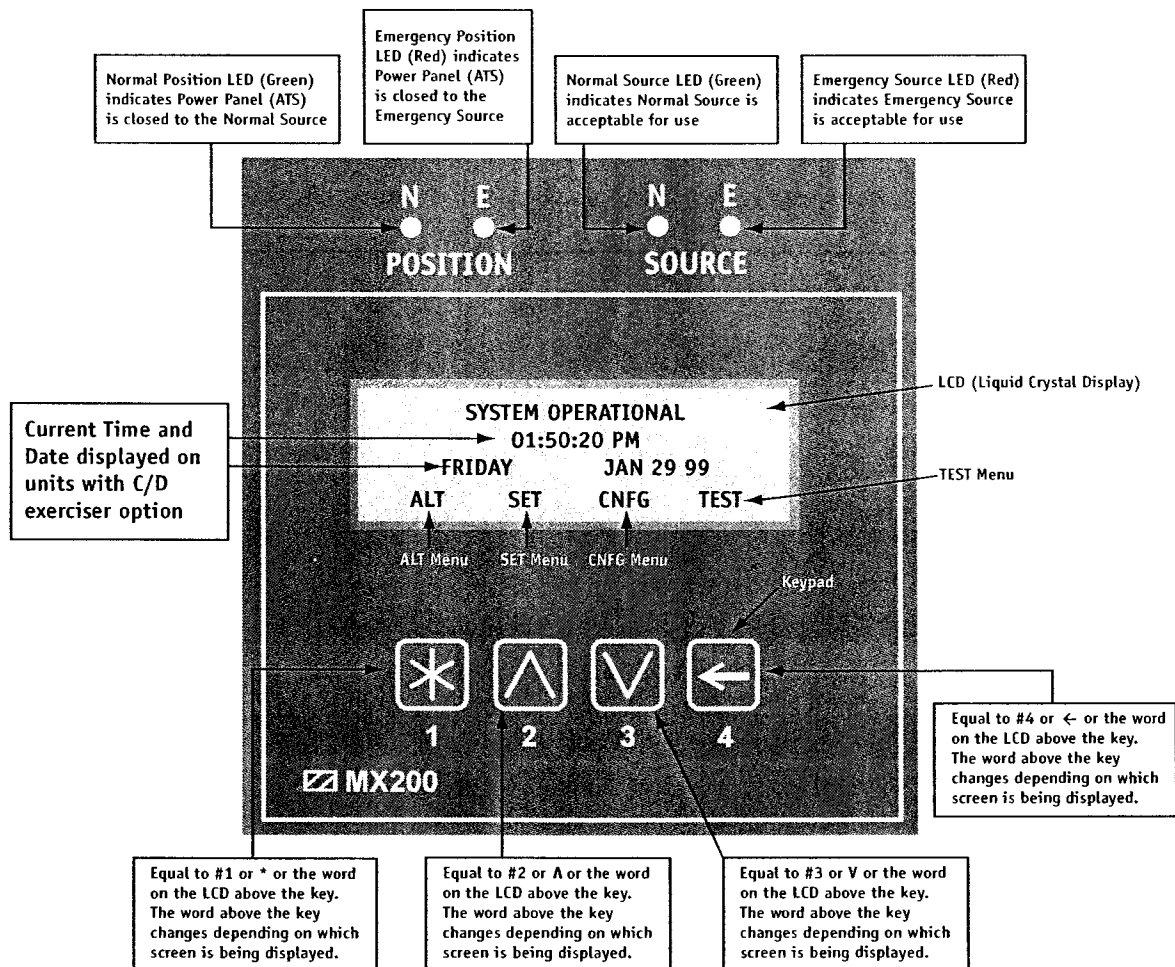
ZNET200

Network card allows communication of ATS position, available source, timers running, etc. to a remote annunciator panel, PC or PLC via one pair of twisted wires. Connections located below P relay. Refer to labeling. Network cable to be Belden 8471, 16AWG (unshielded two conductor twisted pair, not included).

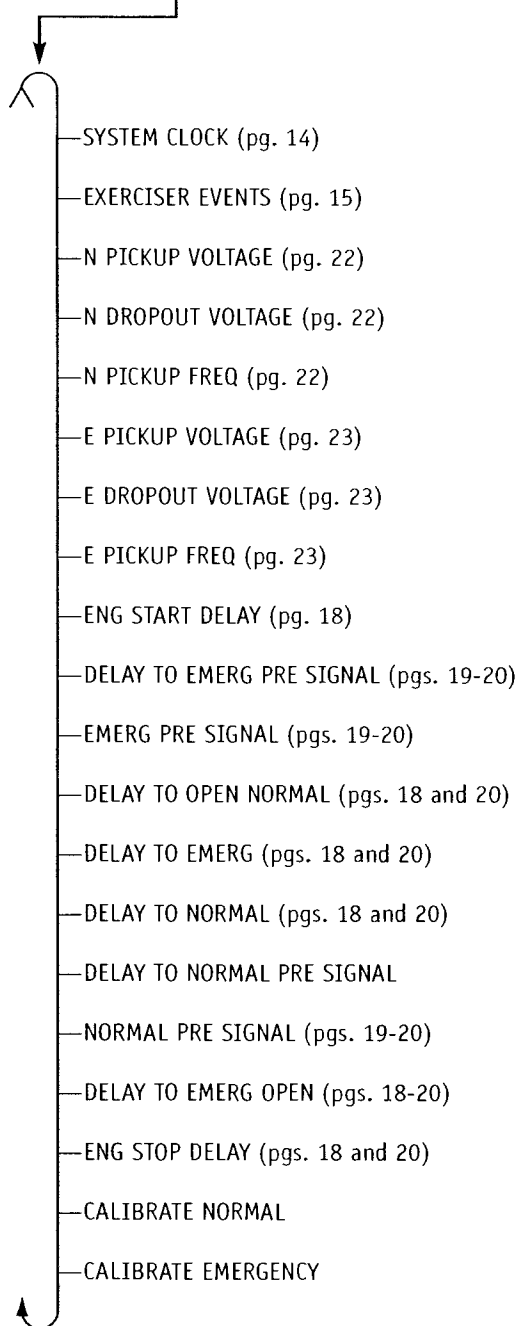
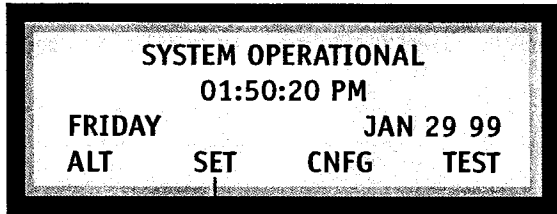
Programmable Options

These options are accessible through the LCD and keypad (see figure below). To become familiar with the options loaded into a particular unit, scrolling through the SET and CNFG menu will show the descriptions of the options (see page 11 and 12). These menus are the very same menus that are used to access the setting and/or configuration of these options. The SET (setting) menu is primarily used to show or change, time and voltage settings. The CNFG menu is primarily used to turn an option on or off. When scrolling through these menus, no changes can be made without entry of the access code. The factory set six-digit access code is located on a white label on the back of the unit (see figure 1).

The MX200 has many logic options. Each controller is downloaded with options at the time of manufacture. The collection of options that any one controller has is specified at the time of order placement. The following pages include all the options that can reside in the controller. Not all units include all options.



User Settings - SET Menu



Change adjustable values through keypad via SET menu.

Key stroke $\left(\begin{array}{c} \text{SET} \\ \square \square \wedge \\ 2 \end{array} \right) \left(\begin{array}{c} \text{SELECT} \\ \wedge \vee \\ 2 \quad 3 \end{array} \right)$ scroll to accessory

description to be changed, then $\left(\begin{array}{c} \text{SET} \\ \square \leftarrow \\ 4 \end{array} \right)$.

Enter six-digit access code $\left(\begin{array}{c} \text{*****} \\ \blacklozenge \end{array} \right)$

$\left(\begin{array}{c} \text{SET} \\ \leftarrow \\ 4 \end{array} \right) \left(\begin{array}{c} \text{SELECT} \\ \wedge \vee \\ 2 \quad 3 \end{array} \right)$ scroll to choose New Value $\square \square$

$\left(\begin{array}{c} \text{STORE} \\ \leftarrow \\ 4 \end{array} \right)$ this will be repeated for each digit to be

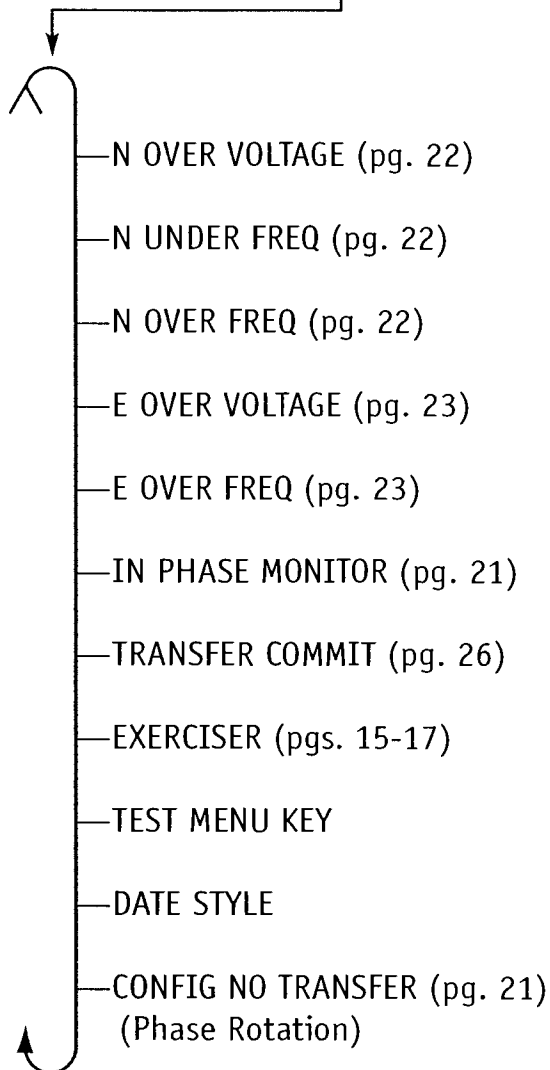
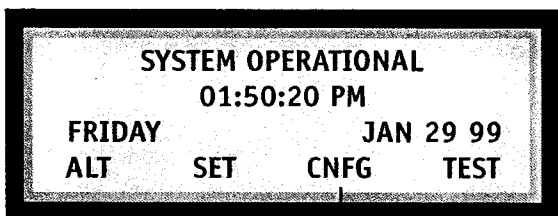
set then $\left(\begin{array}{c} \text{BACK} \\ \square \square * \\ 1 \end{array} \right)$ to get out of SET screens and

save your changes.

◆ The factory assigned six-digit access code is located on the white label on the back of the controller (see figure 1).

* optional

User Settings - CNFG Menu



Turn options ON or OFF via keypad through the CNFG menu.

Key stroke $\left(\begin{smallmatrix} \text{CNFG} \\ \square \square \square \end{smallmatrix} \right) \left(\begin{smallmatrix} \text{SELECT} \\ \wedge \vee \\ 2 \quad 3 \end{smallmatrix} \right)$ scroll to accessory

description then $\left(\begin{smallmatrix} \text{CNFG} \\ \leftarrow \\ 4 \end{smallmatrix} \right)$

enter six-digit access code $\left(\begin{smallmatrix} \text{*****} \end{smallmatrix} \right) \blacklozenge$

$\left(\begin{smallmatrix} \text{CNFG} \\ \leftarrow \\ 4 \end{smallmatrix} \right) \left(\begin{smallmatrix} \vee \\ 3 \end{smallmatrix} \right)$ scroll to ON or OFF

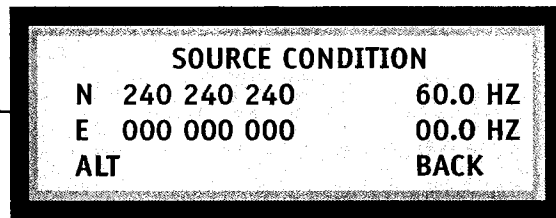
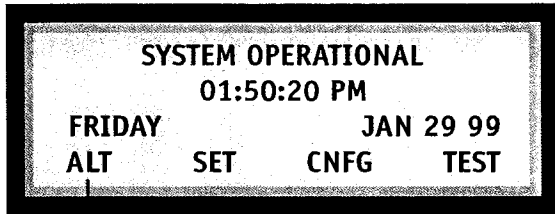
$\left(\begin{smallmatrix} \text{STORE} \\ \leftarrow \\ 4 \end{smallmatrix} \right) \left(\begin{smallmatrix} \text{BACK} \\ * \\ 1 \end{smallmatrix} \right)$ to get out of

CNFG screen and save changes.

\blacklozenge The factory assigned six-digit access code is located on the white label on the back of the controller (see figure 1).


* optional

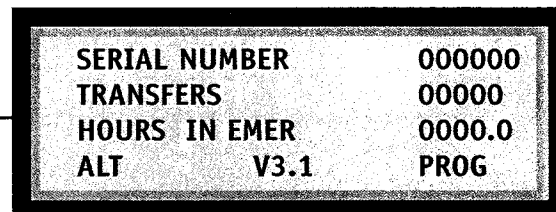
User Settings - ALT Menu



This screen displays line to line voltage values of both sources (A to B, B to C and A to C). Frequency of both sources is also displayed. Display will remain once selected, until transfer occurs. This is an alternate main screen.



This screen provides a lamp test. Pressing  key will test LEDs above screen. This display will revert back to SYSTEM OPERATIONAL after 5 seconds.



This screen provides:

SERIAL NUMBER of the transfer switch unique to each switch.
TRANSFERS is a count of how many times the unit has transferred to Emergency (Total).
HOURS IN EMER is a running total of hours the unit has provided Emergency to the load.
V# is the software version number.

How to Set the System Clock

Set **SYSTEM CLOCK**, time and date:

- Only controllers with the Plant exerciser (C/D) option will show a system clock.
- When the controller does not have this option, the second and third line of the display will be blank during **SYSTEM OPERATIONAL** screen.
- When the clock is present but not set, the display will show **SET SYSTEM CLOCK** on the second line of the **SYSTEM OPERATIONAL** screen.
- The **SYSTEM OPERATIONAL** screen will show time (hours, minutes and seconds) on the second line if the system clock has been set. (Date on third line)

Set the system clock via the SET menu: (Start from **SYSTEM OPERATIONAL** screen)

- * 1. Remove battery protective white plastic strip near P relay (see figure 1)
- 2. Press **SET**
- 3. Scroll to **SET SYSTEM CLOCK** using the up and down keys (**SELECT**)
- 4. Press **SET**
- 5. **ENTER ACCESS CODE** located on the white label on the back of the controller (see figure 1)
- 6. Press **SET**
- 7. Use the up and down keys to change the hour value (AM or PM is also selected)
- 8. Press **STORE** (this will enter this value and move cursor to minutes)
- 9. Use the up and down keys to change the minutes
- 10. Press **STORE** (this will enter this value and move cursor to month)
- 11. Use the up and down keys to change the month
- 12. Press **STORE** (this will enter this value and move cursor to date)
- 13. Use the up and down keys to change the date
- 14. Press **STORE** (this will enter this value and move cursor to year)
- 15. Use the up and down keys to change year
- 16. Press **STORE** (this will enter this value and complete the clock setting)
- 17. To edit settings, press **SET** and repeat steps 6 - 16
- 18. If the setting is satisfactory, press **BACK** (unit then returns to the **SYSTEM OPERATIONAL** screen)

- * *Replacement battery Part # K-4100*
Battery will last 5 years and provides power to retain clock function only
(Controller functions without battery)

How to Set the Plant Exerciser C/D

- Units equipped with this option will display the time of day on second line of **SYSTEM OPERATIONAL** screen (if time is correct, go to step one; if not, see page 14 “How to Set the System Clock”).
- When the second line displays **SET SYSTEM CLOCK** the unit is equipped with the exerciser option, but the **SYSTEM CLOCK** has not been set. **SYSTEM CLOCK** must be set before proceeding (see page 14 “How to Set the System Clock”).
- When a unit is not equipped with this option, the second and third line of the **SYSTEM OPERATIONAL** screen will be blank (Plant Exerciser option is not installed).

Verify the Exerciser is on with the following:

1. Beginning from the **SYSTEM OPERATIONAL** screen, press **CNFG**
2. Using up and down keys, scroll to **CONFIG EXERCISER** screen
3. The lower right-hand corner (above **CNFG**) will show on or off
4. If **on**: press **BACK** and skip to step 12
5. If **off**: continue
6. Press **CNFG**
7. Enter **ACCESS CODE** located on white label on the back of the controller (see figure 1)
8. Press **CNFG**
9. Select “**on**” using up and down keys
10. Press **STORE**
11. Press **BACK** to return the **SYSTEM OPERATIONAL** screen.

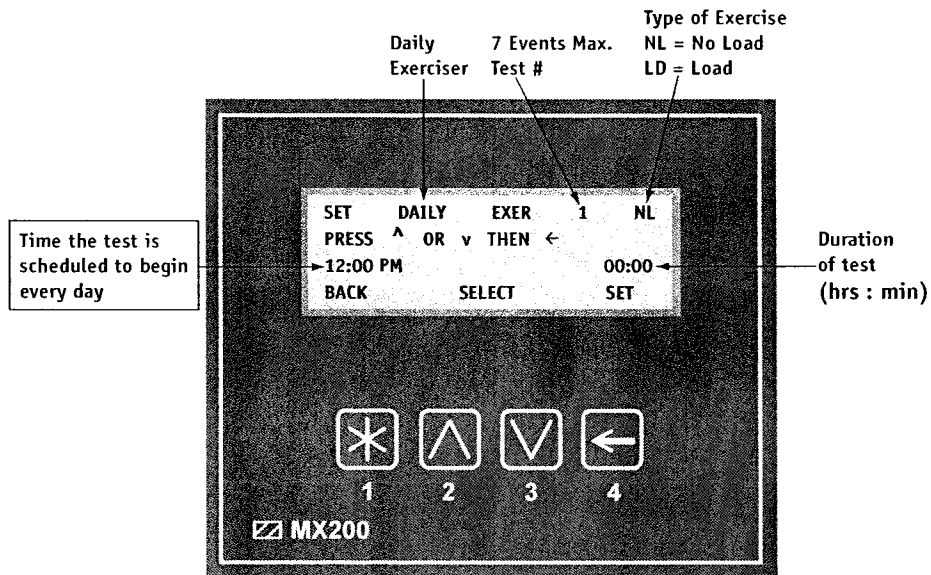
Set the **PLANT EXERCISER** via the **SET** menu after verifying the unit is equipped with this option and it is turned on as per above:

12. Beginning from the **SYSTEM OPERATIONAL** screen, press **SET**
13. Using up and down keys, scroll to **SET PLANT EXERCISER** screen (if this screen cannot be found begin at the top of the page)
14. Press **SET**
15. Enter **ACCESS CODE** located on white label on the back of the controller (see figure 1)
16. Press **SET**
17. The **SET 1WEEK EXER** screen is now displayed (refer to page 16 and 17 to verify type of exerciser installed; 1WEEK, 2WEEK, DAILY OR CLNDR)
18. Press **SET** again
19. Cursor is indicated as a line under character to be changed, move cursor via **STORE** key
20. Change values with up and down keys, press **STORE** after each entry (test duration is hours and minutes)
21. Press **STORE** when complete, until **SAVING RECORD** is displayed
22. Press **BACK** twice when done to return to the **SYSTEM OPERATIONAL** screen.

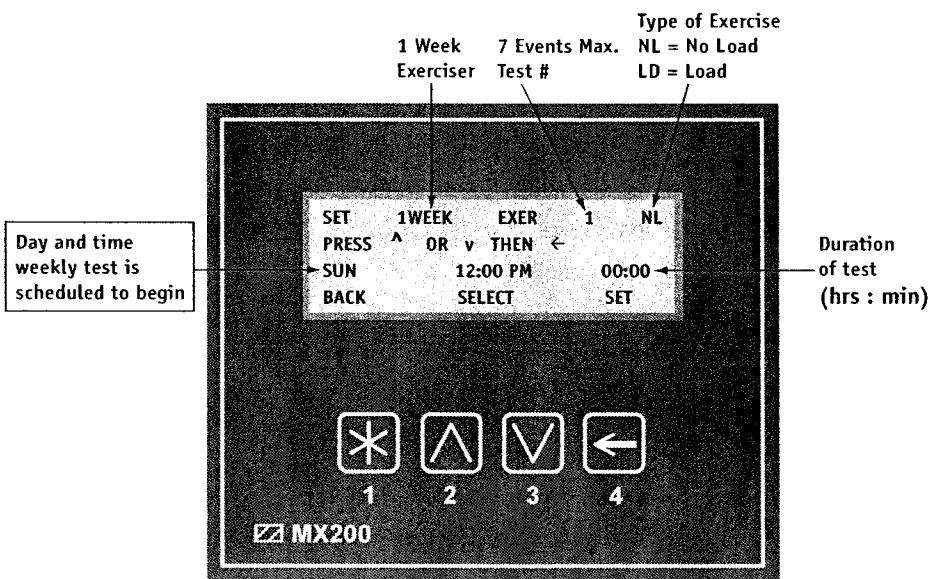
Exerciser Types

Units equipped with the Exerciser Option require that the System Clock be set first. (see page 14)

Daily Exerciser

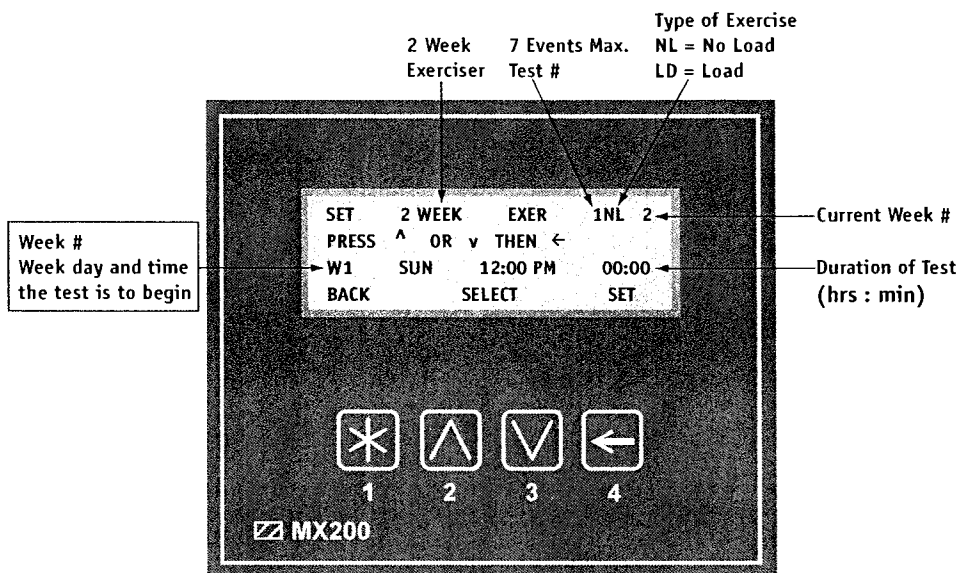


1 Week Exerciser

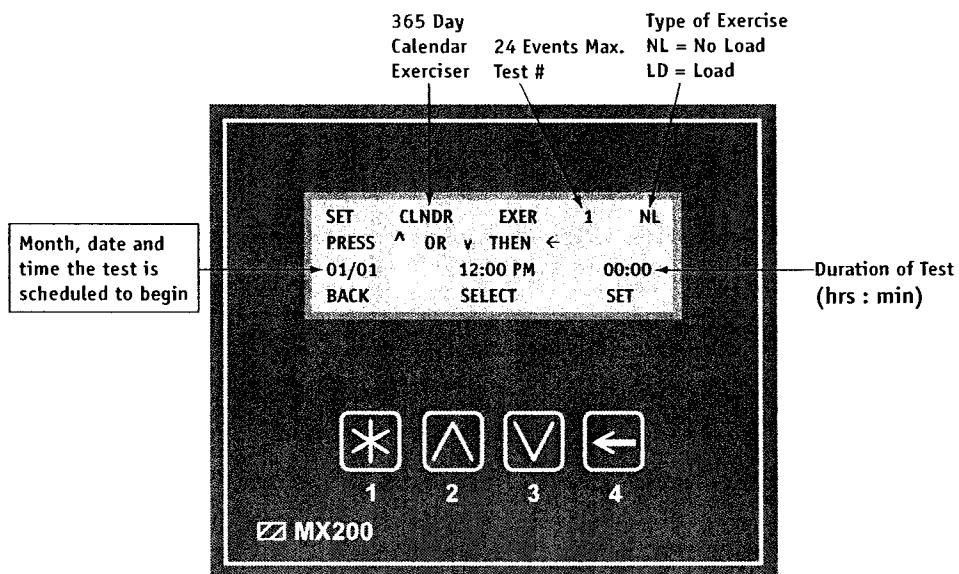


Exerciser Types *(cont'd)*

2 Week Exerciser



365 Day Calendar Exerciser



Timers

P (Engine Start Timer)

adjust via SET menu (*see page 11*)

Factory default 3 seconds

- The purpose of this timer is to ensure that the transfer switch does not start the engine when the Normal power outage is very short.
- The P time range is 0 to 10 seconds in 1/10 of a second increments.
- Timer begins when the Normal fails to meet adjusted parameters.
- When the time setting has lapsed, P relay contacts will operate to start engine (DPDT).

W (Transfer to Emergency Timer)

adjust via SET menu (*see page 11*)

Factory default 1 second

- The purpose of this timer is to ensure the Generator is stable before transfer.
- The W time range is 0 to 5 minutes in 1 second increments.
- Timer begins once the Generator output satisfies adjusted parameters.
- When time setting has lapsed, transfer to Generator will be initiated.

T (Transfer to Normal Timer)

adjust via SET menu (*see page 11*)

Factory default 30 minutes

- The purpose of this timer is to verify that the Normal source has consistently met the sensor parameters for a minimum duration.
- The T time range is 0 to 60 minutes in 1 second increments.
- The T timer begins when Normal satisfies sensor parameters.
- When the timer setting has lapsed, retransfer back to Normal will be initiated. (Timer bypassed upon Emergency failure)

U (Engine Cool Down Timer)

adjust via SET menu (*see page 11*)

Factory default 5 minutes

- The purpose of this timer is to run the Generator unloaded prior to stop.
- The time range is 0 to 60 minutes in 1 second increments.
- The timer begins once the transfer switch has transferred to Normal.
- When the timer setting has lapsed, the P relay will operate to stop engine.

DT/DW (Open Delay Timers)

adjust via SET menu (*see page 11*)

Factory default 5 seconds

- Both DT and DW are center position timers for Delay style ATS Power Panels.
- The purpose of these timers is to control the center off position of delay power panels to allow the back EMF of the load to decay before re-energizing the load.
- These timers have a range of 0 to 10 minutes in increments of one second.
- DT controls how long the ATS stays open when transferring from Emergency to Normal.
- DW controls how long the ATS stays open when transferring from Normal to Emergency.

Timers *(cont'd)*

T3/W3, A6 and A62 (Pre-signal Timers)

adjust via SET menu (*see page 11*)

output connection (*see page 5-7*)

Factory default 20 seconds

- * ■ Both T3 and W3 are pre-signal timers.
 - The purpose of these timers is to provide an output prior to transfer.
 - These outputs are provided to coordinate building systems preparedness for the impending interruption that will occur when transferring from one live source to another.
 - These timers have a range of 0 to 60 seconds in increments of one second.
 - Output is relay contacts (DPDT).
 - T3 takes place prior to transfer to Normal and W3 takes place prior to transfer to Emergency.
 - These timers are bypassed when transferring from a dead source (power outage).
 - Outputs from these timers are commonly used in conjunction with elevators and UPS systems.

Example: A five second T3 timer setting will give a relay output of a 5 second duration, during the last 5 seconds prior to transferring to the Normal source. Once the ATS is in the Normal position, the T3 signal is terminated.

Note: The operation of T3 time is added to the T time ($T+T3$ = transfer delay to Normal). Both T and T3 are canceled if the generator fails during transfer delay. The operation of W3 time is added to the W time ($W+W3$ = transfer delay to Emergency). W3 is canceled during Normal power loss transfer to Emergency. W3 is only active during testing. W timer is always used when transferring to Emergency.

- * ■ **A6** provides contact pre-signal in both directions and is normally closed.
- **A6** utilizes T3/W3 timers to provide pre-signal time setting. This option is configured without the dead source bypassing feature utilized on the standard T3/W3 operating scheme.
- * ■ **A62** option utilizes independent external timers to sequence contact outputs after transfer. These contacts are normally closed contacts that open prior to transfer in both directions (pre-signal duration determined by T3/W3 setting) and re-close in sequence after the transfer is complete (determined by the external timers designated T61, T62, T63...).
- **A62** option is commonly used to shed multiple motor loads prior to transfer and sequentially add these loads after transfer is complete. This option is configured without the bypassing feature utilized on the standard T3/W3 operating scheme.

* optional

Timer Designations

Timer Designations as they appear in the SET menu

ATS Type	P	W	W3 (A6)	DW	T	T3 (A6)	DT	U
Standard ATS	<u>ENG. START</u> <u>DELAY</u>	<u>TO</u> <u>EMERGENCY</u>	↑	↑	<u>TO NORMAL</u>	↑	↑	<u>ENG. STOP</u> <u>DELAY</u>
Standard ATS with pre-signal option; T3/W3, A6 or A62	<u>ENG. START</u> <u>DELAY</u>	<u>TO</u> <u>PRESIGNAL</u>	<u>EMERGENCY</u> <u>PRESIGNAL</u>	↑	<u>TO N-PRE</u>	<u>NORMAL</u> <u>PRESIGNAL</u>	↑	<u>ENG. STOP</u> <u>DELAY</u>
Delay ATS	<u>ENG. START</u> <u>DELAY</u>	<u>TO OPEN N</u>	↑	<u>TO</u> <u>EMERGENCY</u>	<u>TO OPEN E</u>	↑	<u>TO NORMAL</u>	<u>ENG. STOP</u> <u>DELAY</u>
Delay ATS with pre-signal option; T3/W3, A6 or A62	<u>ENG. START</u> <u>DELAY</u>	<u>TO E-PRE</u>	<u>TO OPEN N</u>	<u>TO</u> <u>EMERGENCY</u>	<u>TO N-PRE</u>	<u>TO OPEN E</u>	<u>TO NORMAL</u>	<u>ENG. STOP</u> <u>DELAY</u>
NORMAL FAILS	↑		TRANSFER TO EMERGENCY		↑		TRANSFER TO NORMAL	↑
								ENGINE COOLDOWN

Sensors

* R50 (In Phase Monitor)

can be turned on or off via CNFG menu
(see page 12)

Factory default off

- This feature restricts *live source to live source transfers* to occur only when sources are within 7 electrical degrees or less of each other (*Live source to live source transfers* usually occur during transfer back to Normal or testing).
- R50 does not change the operation of the ATS in a power failure mode.
- R50 operation occurs after all timer functions have lapsed.
- Once the transfer timers have lapsed, the CHECKING FOR SOURCE SYNCHRONISM will be displayed.
- Transfer will then take place once the sources come into sync.
- In the event that the sources do not come within 7 electrical degrees of each other, within 60 seconds the unit will display the message: SYNCH CHECKING PRESS ← TO BYPASS.
- If ← is pressed at this point, the following will be displayed: WARNING PRESSING ← MAY CAUSE DAMAGE TO LOAD DUE TO OUT OF PHASE TRANSFER. Pressing ← again will then actually bypass the R50.
- Since this is a passive device the amount of time that it takes to sync is dependent on the frequency difference between the two sources.
- The Normal source is usually a utility and the frequency is not within the control of the consumer. The Emergency source needs to be adjusted to create an adequate difference in order for the transfer to happen in a timely fashion.

Note: For optimum performance the generator should be adjusted maximum 2 Hertz above or below the utility frequency, minimum .1 Hertz different (58 to 59.9) or (60.1 to 62) Hertz (adjustment of generator to 60.0 hz will cause lengthy transfer delay).

* R16 (Phase Sequencing/Rotation)

can be turned on or off via CNFG menu
(see page 12)

Factory default on

This feature prevents *live source to live source transfers* from occurring between dissimilar phase sequences. This condition is primarily caused by an installation error. Connections from the Normal and Emergency need to be verified, compared and corrected to remedy the inconsistent phase rotation between the two sources.

WARNING: Turning off this option can cause severe damage to loads.

* optional

Normal Sensors

Pick Up Voltage

Factory Default: 90%

This adjustment determines the minimum acceptable voltage required to transfer to Normal. Adjust via the SET menu. Range is 85 to 100% in 1% increments (*see page 11*). Once satisfied, the T timer will begin timing to transfer to Normal.

Pick Up Frequency

Factory Default: 95%

This adjustment determines the minimum acceptable frequency required to transfer to Normal. Adjust via the SET menu. Range is 90 to 100% in 1% increments (*see page 11*). Once satisfied, the T timer will begin timing to transfer to Normal.

Drop Out Voltage

Factory Default: 80%

This adjustment determines the low voltage threshold. Adjust via the SET menu. Range is 75 to 98% in 1% increments (*see page 11*). Drop out must be a minimum of 2% below pickup setting. Once voltage falls below threshold, P timer begins timing to signal generator to start.

*** *Over Voltage (R1)***

This feature, when on, provides a maximum voltage threshold at 110% of nominal system voltage. Turn on or off via CNFG menu (*see page 12*). Once threshold is exceeded, P timer begins timing to signal generator to start.

*** *Under Frequency (J1N)***

This feature, when on, provides a minimum frequency threshold at 2Hz below pick up frequency. Turn on or off via the CNFG menu (*see page 12*). Once the frequency drops below this threshold for more than 5 seconds, the P timer will begin timing to signal the generator to start.

*** *Over Frequency (J2N)***

This feature, when on, provides a maximum frequency threshold of 2 Hz above nominal frequency. Turn on or off via CNFG menu (*see page 12*). Once frequency exceeds threshold, P timer begins timing to signal generator to start.

* optional

Emergency Sensors

Pick Up Voltage

Factory Default: 90%

This adjustment determines the minimum acceptable voltage. Adjust via the SET menu. Range is 85 to 100% in 1% increments (*see page 11*). Once satisfied, the W timer will begin timing to transfer to Emergency.

Pick Up Frequency

Factory Default: 95%

This adjustment determines the minimum acceptable frequency. Adjust via the SET menu. Range is 90 to 100% in 1% increments (*see page 11*). Once satisfied, the W timer will begin timing to transfer to Emergency.

Drop Out Voltage

Factory Default: 80%

This adjustment determines the low voltage threshold. Adjust via the SET menu. Range is 75 to 98% in 1% increments (*see page 11*). Drop out must be a minimum of 2% below pickup setting. Once the voltage falls below this threshold, the T timer will be bypassed to expedite the transfer to Normal.

*** *Over Voltage (R8)***

This feature, when on, provides a maximum voltage threshold at 110% of nominal voltage. Turn on or off via the CNFG menu (*see page 12*). Once this threshold is exceeded, the T timer will be bypassed to expedite the transfer to Normal.

*** *Over Frequency (J2E)***

This feature, when on, provides a maximum frequency threshold of 2Hz above of nominal frequency. Turn on or off via the CNFG menu (*see page 12*). Once the frequency exceeds this threshold, the T timer will be bypassed to expedite the transfer to Normal.

Under Frequency

This feature provides a minimum frequency threshold at 2Hz below pick up frequency. Once the frequency drops below this threshold, if sustained for more than 5 seconds, the T timer will be bypassed to expedite the transfer to Normal.

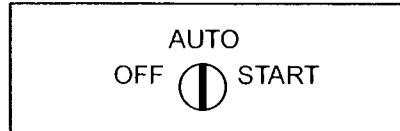
* optional

Optional Pilot Devices

Door Mounted Options

The S options are usually options related to a manually operated switch mounted on the door of the enclosure, which provides access to a feature or function.

S1

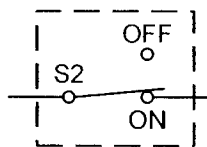


Selector Switch

Provides start-stop control of the engine from the transfer switch panel.

- AUTO** Position provides Normal operation of the transfer switch and the engine.
- OFF** Position disconnects the transfer switch start contact from the engine. Then engine can only be started manually in this position.
- START** Position closes the circuit to the engine, causing it to start and run until the switch is moved from the start position.

S2

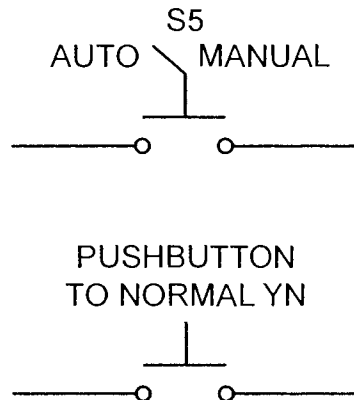


Engine Disconnect Switch

Interrupts the engine start circuit when in the “OFF” position.

Optional Pilot Devices *(cont'd)*

S5

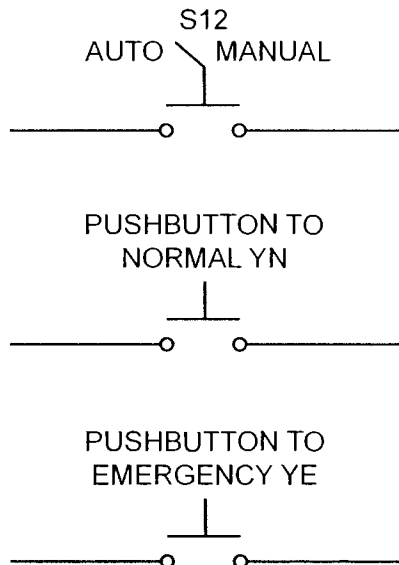


Auto/Manual Retransfer Selector Switch

In **AUTO**, retransfer to Normal is Automatic after T timer times out. T time delay is bypassed if Emergency fails.

In **MANUAL**, retransfer to Normal occurs upon manual depression of YN or if Emergency fails.

S12



Auto/Manual Selector Switch

When the S12 is in the **AUTO** position, the Automatic Transfer Switch functions automatically as specified with the switch drawing.

When the S12 Switch is in the **MANUAL** position, the Automatic Transfer Switch will transfer either direction only by depression of Normal (YN) or Emergency (YE) Pushbutton.

NOTE: When in **MANUAL**, the switch maintains position, even if the selected power fails.

Optional Pilot Devices *(cont'd)*

S13

Transfer Commit

(this feature is standard)

can be turned on or off via CNFG menu
(see page 12)

When the Transfer commit is set to the Y (Yes) position

- The ATS is committed to transfer to the Emergency position once the W timer has begun timing, even if Normal returns before the transfer to Emergency occurs.
- This is to ensure that the transfer takes place, because one outage is often followed by another.

When the transfer commit is set to N (No) position (factory default)

- The ATS is not committed to transfer unless the outage duration is longer than the timers that precede the transfer to the Emergency position.
- This assumes that the outage will be an isolated event.

S14

Test Switch, Three Position, Key Operated (Spring Return to Center)

Holding the Selector Switch in **TEST** will transfer the ATS to Emergency. Releasing the switch (to **AUTO** position) will return the ATS to Normal through the **T** timer function.

Holding the Selector Switch in **YN** Normal position will bypass the **T** timer and immediately transfer the ATS back to Normal. Releasing the Selector Switch allows the Selector Switch to return to **AUTO** position.

Testing

▲ NOTICE

A periodic test of the transfer switch under load conditions is recommended to insure proper operation.
(See National Electric Code articles 700 and 701).

Start generator and verify proper voltage, frequency and phase sequence (match to Normal). Shut down gen set and place in Auto. Complete the visual inspection of the transfer switch, and close the cabinet door.

Initiate the test by pressing the TEST button on the LCD keypad. The controller will then prompt for your access code (as shown on Figure 1). After entering the code, three test options will appear—STD LOAD, FAST LOAD and NO LOAD (See Figure 3).

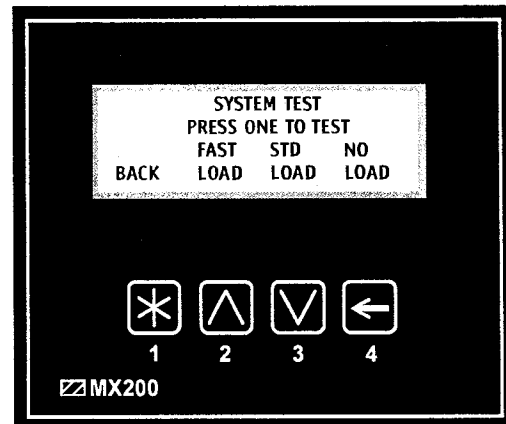


Figure 3

- **STD LOAD** test starts the generator and using the current timer settings, transfers the load to the Emergency source.
- **FAST LOAD** test presets timer values to a maximum 30 seconds during the test. After completion of the test, all timers are reset to their original values. (T3, W3, DT and DW remain)
- **NO LOAD** test starts the generator but does not transfer the load to the Emergency source. Press and hold the desired test option button until the switch transfers to the Emergency source (load test) or until the generator has been run for the desired amount of time (no load test). Releasing the test button before W timer timeout will abort the test (Exception: see transfer commit option, page 26).

When the test is initiated, the controller first starts the P timer. Upon completion of the P time delay, an engine start signal is sent. After Emergency has reached preset levels, the W timer begins its timing cycle. This timer is used to ensure the voltage and frequency of Emergency has stabilized before transfer. If either the voltage or frequency of Emergency fall below preset limits the test will be terminated, and the U timer will time out. If the voltage and frequency remain within preset limits for the duration of the W time delay, the transfer switch will close into the Emergency source.

Deactivating the test switch initiates retransfer to the Normal source. The switch will retransfer after the time delay of the T timer. This timer is used to ensure that the Normal source is stable before retransfer. Immediately after retransfer, the U timer begins its timing cycle. The U timer is the engine cool down timer which allows the engine generator to run unloaded.

NOTE: Only the P timer is used during the no load test.

Troubleshooting

Before beginning any troubleshooting activity, refer to the information package supplied with the transfer switch and review the description and operation of all accessories supplied. Also refer to the Installation section of this manual.

Engine Does Not START

Annunciation	Possible Cause	Corrective Action
EMERGENCY AVAILABLE LED off	Engine start wires not terminated properly	Check Engine Start Connections
	Generator in "OFF" position	Investigate why Engine Control Switch was turned off

Engine Does Not STOP

Annunciation	Possible Cause	Corrective Action
LCD Display - "Delay to Engine Stop"	U timing cycle not complete	Check U Timer setting
NORMAL POSITION, and NORMAL and EMERGENCY AVAILABLE LEDs on, but U timer has timed out	Engine start wires not terminated correctly	Check Engine Start Connections
	Generator in "Manual"	Put generator in "Auto"

ATS Will Not Transfer To EMERGENCY

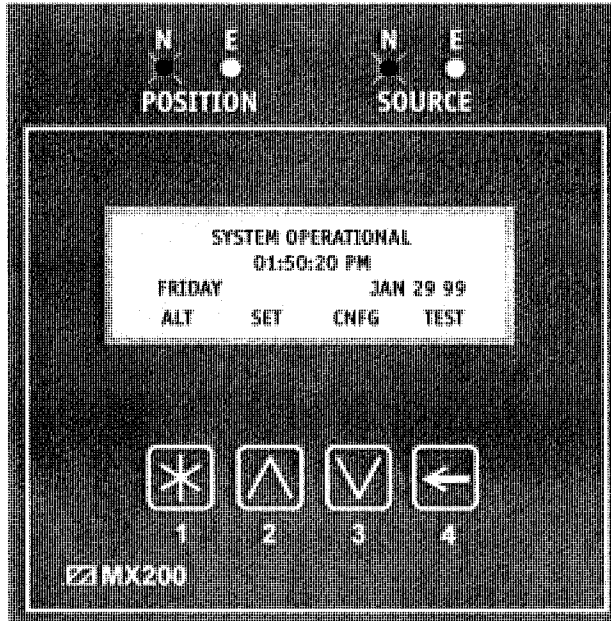
Annunciation	Possible Cause	Corrective Action
EMERGENCY AVAILABLE LED off	Emergency voltage or frequency not within acceptable parameters	Check Engine Start Connections, Generator Breaker, Generator output, and Engine Control Switch
None	Power supply connector unplugged	Plug in connector
LCD Display - "Mechanical Failure"	Limit switch or RT box connector unplugged	Plug in connector
LCD Display - "Delay to Emergency"	W timing cycle not complete	Check W Timer setting

ATS Will Not Transfer To NORMAL

Annunciation	Possible Cause	Corrective Action
NORMAL AVAILABLE LED off	Normal voltage or frequency not within acceptable parameters	Check utility and utility breakers
None	Power supply connector unplugged	Plug in connector
LCD Display - "Mechanical Failure"	Limit switch or RT box connector unplugged	Plug in connector
LCD Display - "Delay to Normal"	T timing cycle not complete	Check T Timer setting

Power Failure Sequence of Operation

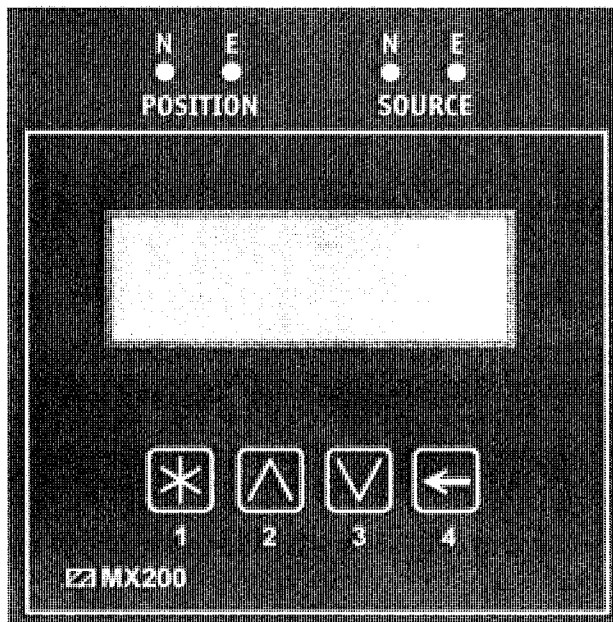
LEDs Green - Green



Normal Source Available

ATS Normal Position

LEDs OFF

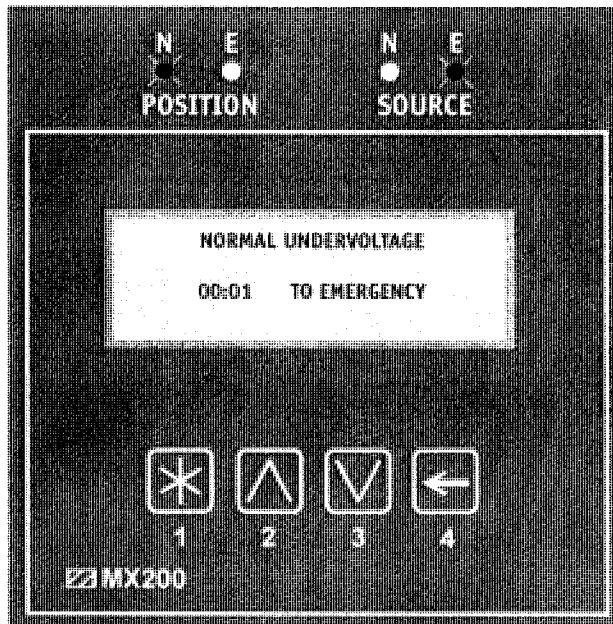


Normal Source Failed

**Engine Starts After
ENG START DELAY (P)
(No Power Available)**

Power Failure Sequence of Operation *(cont'd)*

LEDs Green - Red

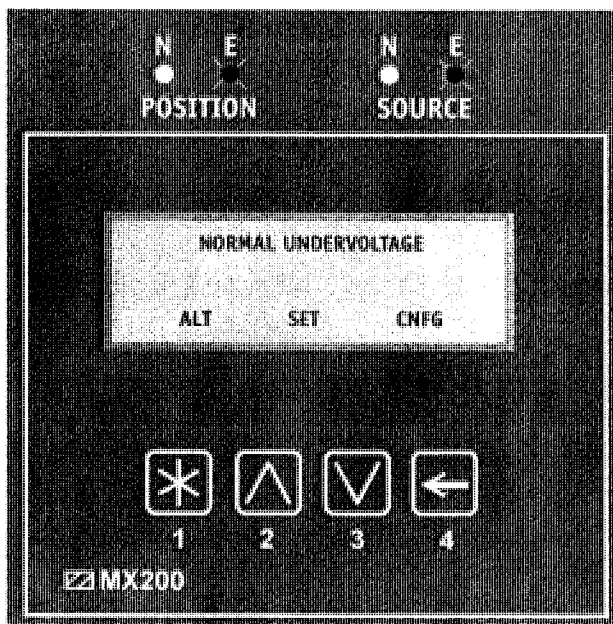


**ENG START DELAY
Lapsed**

**Emergency Source
Available**

**Transfer TO EMER-
GENCY Timing (W)**

LEDs Red - Red

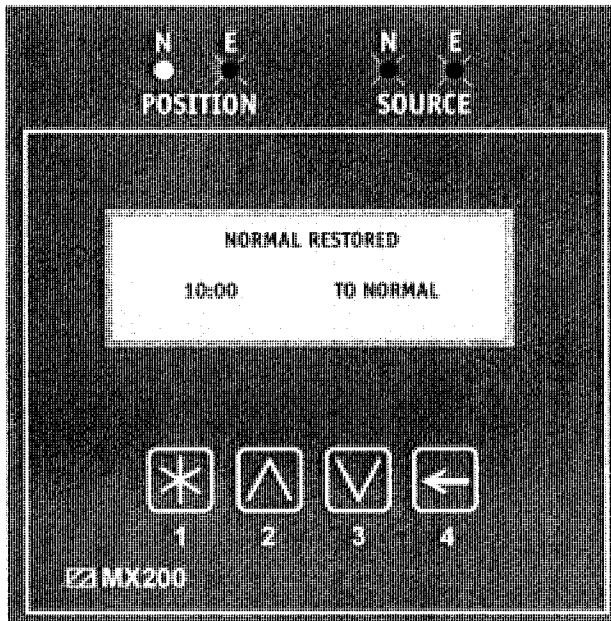


**TO EMERGENCY
Lapsed (W)**

**ATS Transferred to
Emergency Position**

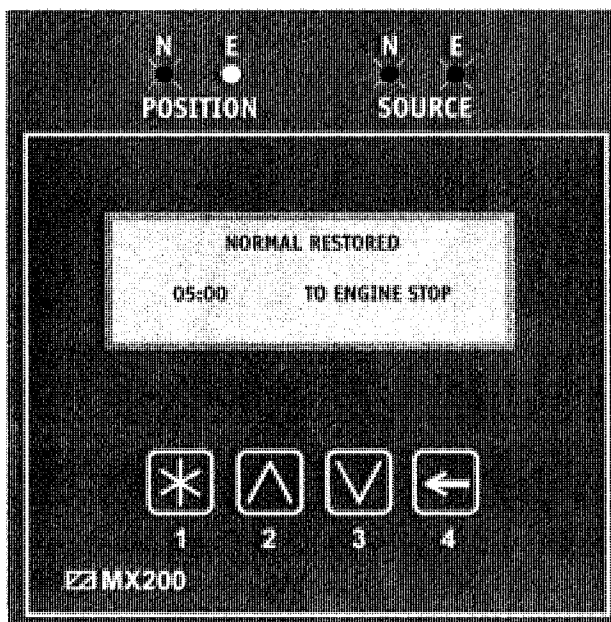
Power Failure Sequence of Operation *(cont'd)*

LEDs Red - Green - Red



**Normal Source Returned
TO NORMAL Timing (T)**

LEDs Green - Green - Red



**Transfer TO NORMAL
Lapsed (T)**

**ATS Transferred to
Normal Position**

**Once ENGINE STOP
is complete,
return to Screen #1**

Index of Terms

Term	Definition	Page
A1	Normal Availability output relay contact	4
A1E	Emergency Availability output relay contact	4
A3	Emergency position output contact	5
A4	Normal position output contact	5
A6	Pre-signal contact either direction	5
A62	A6 with sequential pick up after transfer	6
Access Code	Six numeric digit required for program changes	2 (figure 1)
ALT	Alternate Main Screen	13
ATS	Automatic Transfer Switch	
Aux. Panel	Auxiliary Control Panel	
Battery	Clock Battery K-4100	14
CNFG	Menu for configure parameters	12
D Type Switch	Transfer switch with an off position (3 position)	
DS	Disconnect Switch (located on Power Panel)	
DT	Delay Timer from open to Normal (D Type Switch)	18, 20
DW	Delay Timer from open to Emergency (D Type Switch)	18, 20
E	Emergency	
E-Contact	Engine Start output relay contact	3
Emergency	Alternate Power Plant / Engine Generator Set	
Exerciser Clock	Time clock for automatic generator test	15-17
Input	Voltage applied from a remote source	
J1N	Normal Under Frequency Sensor	22
J2E	Emergency Over Frequency Sensor	23
J2N	Normal Over Frequency Sensor	22
Keypad	User interface keys	10
LCD	Liquid Crystal Display	10
LED	Light Emitting Diode	10
MX200	Micro processor based controller	
N	Normal	
Normal	Utility power (preferred source)	
Output	Indication via dry contacts	3-7
P	Delay timer to Engine Start	18, 20
P2	Extended time range P	

Index of Terms

Term	Definition	Page
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Power Panel	Structure that transfers load between two sources of power	
Q2	Input for Remote Peak Shave/Test	8
Q3	Input to inhibit transfer to Emergency	8
Q7	Input to inhibit transfer to Normal	8
R1	Normal Over Voltage Sensor	22
R8	Emergency Over Voltage Sensor	23
R15 (load shed)	Input to transfer off Emergency to dead Normal	9
R15D (load shed)	Input to transfer off Emergency to open position (D Type Switch)	9
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Retransfer	Transfer back to Normal source	
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S13	Transfer Commit	26
S14	Selector; Test-Auto-YN	26
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S5	Selector; Auto or Manual retransfer	25
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Test	Simulated utility power outage	
Test Switch	Simulates utility power outage	
U	Engine cool down timer	18, 20
UPS	Uninterruptable Power Source	
W	Delay timer to transfer to Emergency	18, 20
W3	Pre-signal to Emergency transfer timer	19, 20
YE	Push button to Emergency	25
YN	Push button to Normal	25
ZNET200	Network communication card	9
ZTS	Zenith Transfer Switch	



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