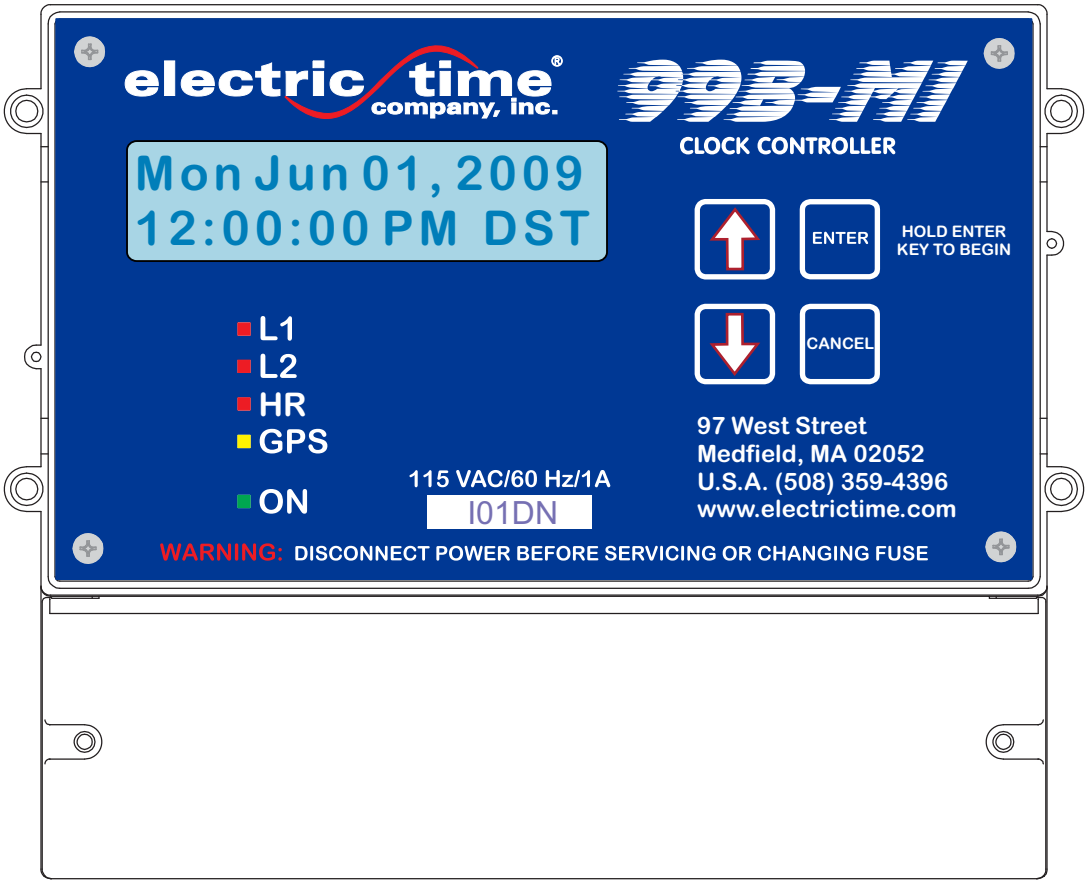
electric time® company, inc.

M274

998-MI USER'S MANUAL

Minute Impulse Clock Controller



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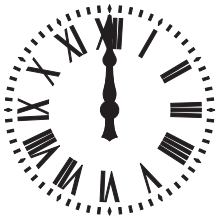
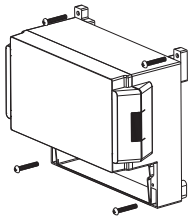
QUICK START GUIDE

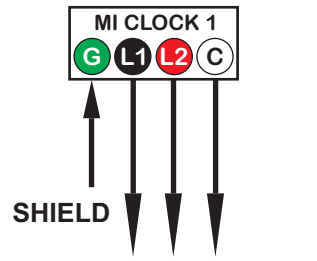
1) DISCONNECT 115VAC POWER CIRCUIT BEFORE MAKING ANY WIRING CONNECTIONS



2) INSTALL ALL CLOCKS WITH CLOCK HANDS POINTING AT 12:00

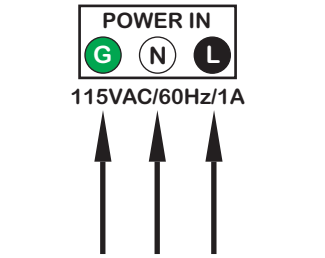


3) INSTALL 99B-MI CLOCK CONTROLLER (#10 SCREWS RECOMMENDED)



4) CONNECT 99B-MI CLOCK CONTROLLER TO CLOCKS (24VAC - 16AWG RECOMMENDED)

- 4 OUTPUTS PROVIDED LABELED “MI CLOCK” 1-4
- “HOME RUN” WIRING REQUIRED FROM EACH CLOCK TO 99B-MI OUTPUTS “MI CLOCK” 1-4
- SHIELDED CABLE RECOMMENDED



5) CONNECT DEDICATED 115VAC BRANCH CIRCUIT TO 99B-MI CLOCK CONTROLLER

6) TURN ON 115VAC POWER

7) CLOCKS WILL AUTOMATICALLY RESET TO CORRECT TIME

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INTRODUCTION

The 99B-MI Clock Controller is a microprocessor based master clock that provides completely automatic control of Electric Time minute impulse clocks.

- Provides “Minute Impulse” (MI) Control (Clock hands index from one minute to the next)
- Automatically resets clocks after power failures (Resets at 6X speed)
- Automatically resets clocks for Daylight Savings Time (if required)
- Customizable Daylight Saving Time
- Precision Quartz Time Base
- Optional GPS interface for ultimate time keeping accuracy
- 10 Year Battery Backup for time base
- For indoor or outdoor use - Protected to IP65
- ETL listed to UL 863

SPECIFICATIONS

Input Power	115VAC/50 or 60Hz/1A or 230VAC/50 or 60Hz/0.5A (Factory Preset)
Timebase Drift	+/- 4 min / year (standard), NONE (GPS)
Clock Outputs	24VAC Minute Impulse • Controls up to (4) Minute Impulse (MI) Clocks 24VDC Reverse Polarity • Controls up to (20) Reverse Polarity (RP) Clocks 24VAC Sweep Second line (continuous power) • Controls up to (2) MI Clocks with Sweep Second Hands **For multiple clock arrays, contact Electric Time to verify maximum electrical loads on 99B-MI
Event Outputs	24VAC Hour Strike (configurable pulse output)
Communication	RS-232 port, RS-485 port

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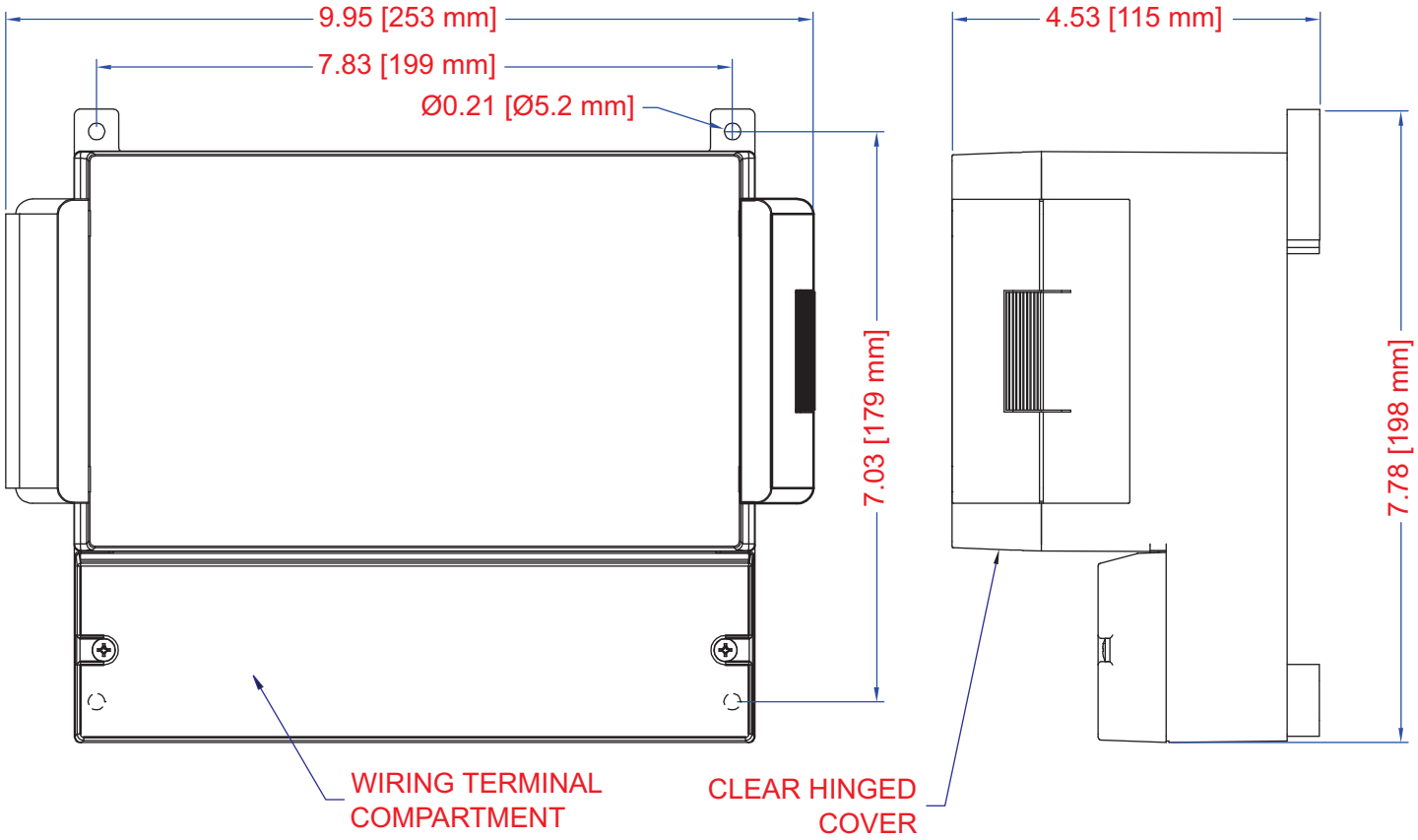
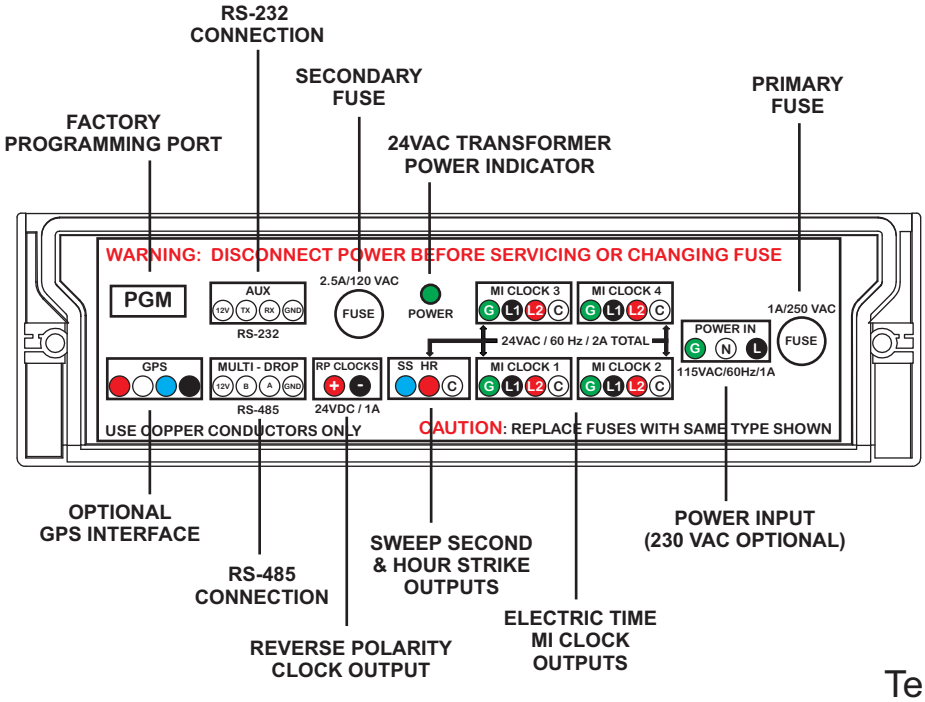


DIMENSIONS IN INCHES [MILLIMETERS]



Terminal Compartment Layout

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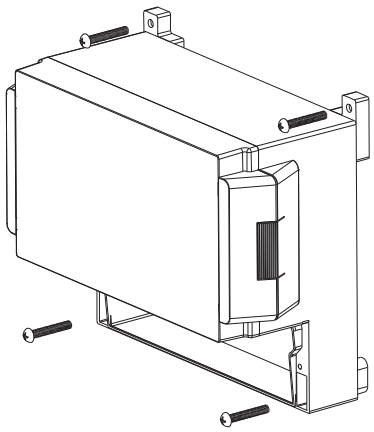
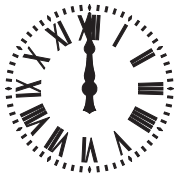


MOUNTING

Mount the 99B-MI in an accessible location using suitable hardware per installation (#10 Screws recommended)

BEFORE MAKING CONNECTIONS !

Shut off power to all circuits before making any electrical connections. DO NOT connect 115VAC mains power to 99B-MI until all other wiring connections have been made

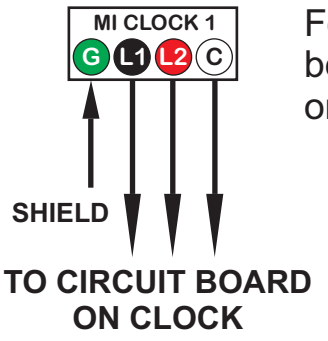


All clocks should be installed / mounted with all clock hands pointing at 12:00. Clocks will automatically reset to correct time when power is applied to 99B-MI

For ease of installation, all 99B-MI Inputs & Outputs are shown on the wiring label on the inside of the terminal compartment cover. (See Pg. 5)

CONNECTING “MI CLOCKS”

(Minute Impulse - 24VAC)



For multiple clocks, “Home Run” wiring is required between each clock and one of the “MI CLOCK” outputs on 99B-MI

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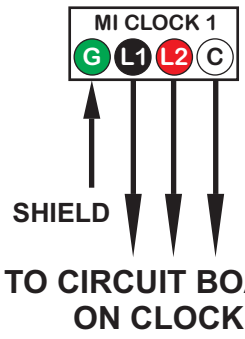
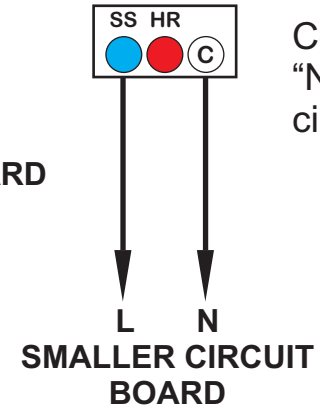
CONNECTING "MI-SS CLOCKS"

(Minute Impulse, Sweep Second - 24VAC)



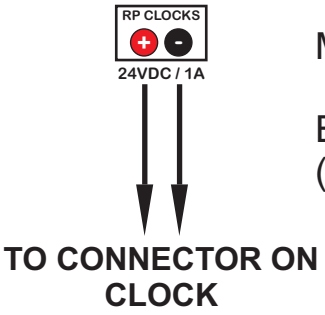
For multiple clocks, "Home Run" wiring is required between each clock and one of the "MI CLOCK" outputs on 99B-MI



Connect "SS" & "C" terminals to the "LINE" and "NEUTRAL" terminals respectively of the smaller circuit board on the clock

CONNECTING "RP CLOCKS"

(Reverse Polarity - 24VDC)



Multiple clocks to be wired in parallel

Ensure that polarity is the same for all clocks
(i.e. wires connect to same side of connector on all clocks)

CONNECTING "GPS"

Connect GPS Receiver to "GPS" terminals, matching wire colors to colors shown on wiring diagram on inside cover of terminal compartment

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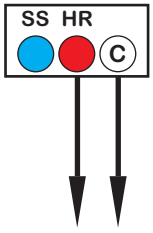
CONNECTING “HR” OUTPUT



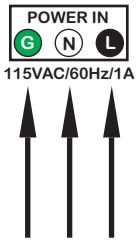
TO EXTERNAL
DEVICE OR RELAY

Connect “HR” & “C” terminals to LINE & NEUTRAL terminals respectively of external device
(See Manual M274-C for explanation of “HR” Output function)

CONNECTING “MULTI-DROP” & “AUX”

For custom installations only. Contact Electric Time for information.

POWER CONNECTION



115VAC DEDICATED
BRANCH CIRCUIT

Connect **Ground**, **Neutral** and **Line** terminals to 115 VAC dedicated branch circuit

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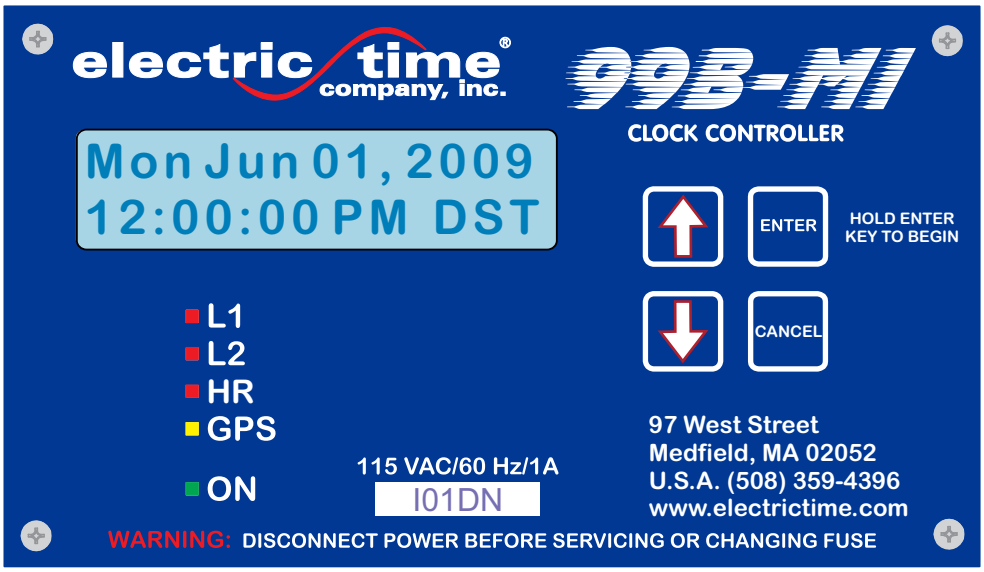
USER INTERFACE



1) **LCD Display**

2) **ENTER**
- Hold for (5) seconds to access menus
- Use to activate menus and make selections

3) **CANCEL**
- Use to cancel active menu selections
- Hold for (5) seconds to exit all menus

4) **UP / DOWN** Arrows
- Use to scroll through menus and menu selections

5) **LED's**
- L1 / L2: Indicate which MI output line is active
- HR: Indicates status of HR output
- GPS: Indicates status of GPS
  - OFF: GPS not connected
  - Flashing: GPS found but not locked
  - ON: GPS locked
- ON: Blinks to indicate 99B-MI is on and processor is running

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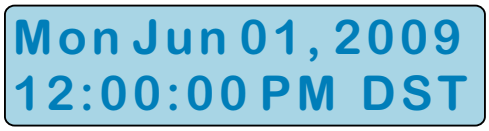
BASIC DISPLAYS

"Running" Display

- Displays current Date and Time
- Displays "DST" during periods of the year when Daylight Savings Time is being observed (will not be displayed in locations not observing Daylight Savings Time)



"Correcting Clock" Display

- Appears when clock is resetting
- Alternates with Running Screen every 6 seconds
- Displays current location of clock hands
- Note: If clock hands are fast by 2 hours or less, hands will not move during reset mode

OPERATION

The 99B-MI Clock Controller is designed for fully automatic operation. However, should user intervention be required, review the following instructions for proper operation of the 99B-MI.

Accessing Menus

- Hold ENTER key for (5) seconds

Making Menu Selections

- Use UP / DOWN arrows to scroll through menus
- Press ENTER key once to activate menu choices
- Use UP / DOWN arrows to scroll through menu choices
- Press ENTER key to select menu choice
- Hold CANCEL key for (5) seconds to exit menus and return to "Running" Screen

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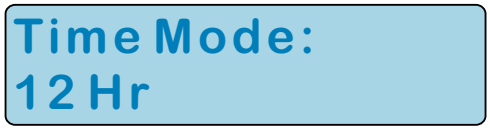
BASIC SETUP FUNCTIONS

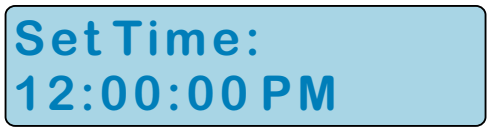
"Time Mode:"

- 12 Hr: Sets LCD display to standard 12 Hour clock
- 24 Hr: Sets LCD display to "Military Time" 24 Hr clock



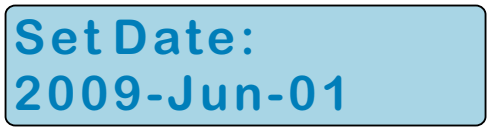
"Set Time:"

- Allows user to set time shown on LCD display
- Displays "GPS" if GPS is being used
- NOTE: User cannot set time when GPS is locked (GPS always maintains correct time)



"Set Date:"

- Allows user to set Date



"Enter Hand Pos:"

If clock hands are not indicating correct time, user must tell 99B-MI where hands are pointing so controller can reset hands to correct position.

- Enter position of clock hands
- Clock hands will not move while this menu is displayed
- This menu will not "time out" or shut off, so user has time to go outside building to view clock if necessary
- When done, hold "CANCEL" key for 5 seconds to exit menus and allow 99B-MI to reset clocks to correct time

"Chimes"

- Allows user to configure Chimes and Hour Strike outputs
- See Manual M274-C (99BMI Chime System)

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BASIC SETUP FUNCTIONS (continued)

"Exit User Mode?"

Exit User Mode?
NO

- **NO**: Does nothing, stays on "Exit User Mode?" Menu
- **YES**: Exits menus and returns to "Running Screen"
- **Enter Tech Mode**: Allows user to access special technician menus

---

TECH MODE

"Event Log:"

Press ENTER Key
To Read Log

- Displays record of events, power ups, etc.
- The (10) most recent events are displayed
- Events are logged in the format: # MMDDYY HHMM EE, where # is the number of the event (0-9), MMDDYY HHMM is the date and time the event occurred, and EE is the event code
- **Event Codes:**
  - 01: Power Up Sequence
  - 02: GPS-Clock Synchronization
  - 03: Brownout Sequence

"L1/L2 Drive Opt:"

L1/L2 Drive Opt:
Minute Impulse

- For custom projects only, contact Electric Time Co for details
- Set to **Minute Impulse** by default. Clocks will not operate properly if changed!!

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TECH MODE (Continued)

"RP Hand Pos:"

- Allows user to correct ONLY the RP clock movement hand position
- NOTE: Only pertains to RP (reverse polarity) Clock movements. Use "Set Hands" in user mode for all other clock types

RP Hand Pos:
11:40

"Set UTC Offset:"

- Allows user to set their local time offset from Greenwich Mean Time
- **GPS NOTE**: UTC offset must be set correctly for GPS to maintain correct time

Set UTC Offset:
-05:00

United States UTC offsets:

▸AST	-04:00	Atlantic Standard Time
▸EST	-05:00	Eastern Standard Time
▸CST	-06:00	Central Standard Time
▸MST	-07:00	Mountain Standard Time
▸PST	-08:00	Pacific Standard Time
▸AHST	-10:00	Alaska-Hawaii Standard Time

"Daylight Saving Mode"

- **Table**: 99B-MI will update time for Daylight Saving time changes.
- **Rule**: Time changes will take place on set month, week and day (DST start adjusts local time forward, DST End adjust local time backwards).
- **Disabled**: 99B-MI will NOT update time for Daylight Saving time changes.

Daylight Saving
Mode: Table

"Set DST Offset:"

- Allows customization of the Daylight Saving time offset. (Note: this only changes offset amount, not forwards or backwards

Set DST Offset:
60 Minutes

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TECH MODE (Continued)

"DST Start" (Only visible when RULE is selected)

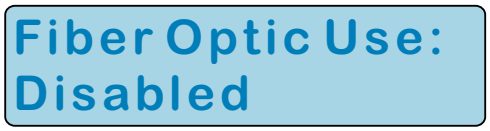
- **Week**: Sets the time change to start on the 1st, 2nd, 3rd, 4th or Last week of the month
- **Day**: Sets the day the time changes. All time changes take place at 2am.
- **Month**: Sets the month the time change will start

"DST End" (Only visible when RULE is selected)

- **Week**: Sets the time change to end on the 1st, 2nd, 3rd, 4th or Last week of the month
- **Day**: Sets the day the time changes. All time changes take place at 2am.
- **Month**: Sets the month the time change will end

"Fiber Optic Use:"

- For custom projects only
- Contact Electric Time for information



"Advance Hands?"

- **NO**: Does nothing, stays on "Advance Hands?" Menu
- **YES**: Advances clock hands indefinitely until stopped manually
- **To 12:00**: Advances clock hands to 12:00 and stops

Note: Pressing the Enter key again allows the target time to be changed.

"Leave Tech Mode?"

- **NO**: Does nothing, stays on "Leave Tech Mode?" Menu
- **Exit All**: Exits menus and returns to "Running Screen"
- **Enter User Mode**: Enters User Mode menus

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TROUBLESHOOTING

"MY CLOCKS ARE NOT ON TIME"

- Clock hands are still operating, but are not indicating correct time

1) Is the time shown on the 99B-MI correct?

YES: Goto Step 3
NO: Goto Step 2

2) Correct the time shown on the 99B-MI

- Hold the "ENTER" key for 5 seconds to access menus
- Use Down arrow to scroll through menus until "Set Time:" menu is visible
- Hit "ENTER" key once to access "Set Time:" menu
- Use Up or Down arrows to adjust Hours
- Hit "ENTER" key to move to minutes
- Use Up or Down arrows to adjust Minutes
- Hit "ENTER" key to move to seconds
- Hit "ENTER" key to "00" seconds and accept changes that were just made
- Hold "CANCEL" key for 5 seconds to exit menus and allow clocks to self-correct

3) Tell 99B-MI where clock hands are **actually pointing** to allow it to correct the clock

You will enter the time the clock hands are reading into the controller. The controller will then move the hands to the correct time.

- Hold the "ENTER" key for 5 seconds to access User Mode
- Use Down arrow to scroll through menus until "Enter Hand Pos:" menu is visible
- *When "Enter Hand Pos:" menu is being displayed, clock hands will NOT move*
- **STOP HERE AND READ THE TIME ON THE CLOCK**
- Hit "ENTER" key once to access "Enter Hand Pos:" menu
- Use Up or Down arrows to set Hours to whatever hour clock hands indicate
- Hit "ENTER" key to move to minutes
- Use Up or Down arrows to set Minutes to whatever minute clock hands indicate
- Hit "ENTER" key to accept changes to hand position
- Hold "CANCEL" key for 5 seconds to exit menus and allow clocks to self-correct
- The display will alternate between "Correcting Clock Hands at:" and the actual time and date information

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TROUBLESHOOTING

"MY CLOCKS ARE NOT MOVING"

Under certain conditions, when the 99B-MI is automatically correcting the clock hands (i.e. "Reset Mode"), the hands may not move for up to 2 hours. This is NORMAL. To determine if there is a actually a problem with your 99B-MI or your clocks, see below.

CAUTION: ONLY A QUALIFIED ELECTRICIAN SHOULD PERFORM ANY TROUBLESHOOTING RELATED TO ELECTRICAL WIRING

1) Is the 99BMI live?

- If the LCD Display is working and the green "ON" LED is blinking, the 99BMI is live

YES: Goto Step 2
NO: Check 115VAC input power and both fuses in wiring compartment

2) Is the green LED marked "ON" in the 99BMI Front Panel blinking?

YES: Goto Step 3
NO: Contact Electric Time Company Service Department

3) Is the 99B-MI providing power to the clocks?

- Open the wiring compartment cover (unscrew the two hold-down screws)
- Is the 2.5A secondary fuse blown?

YES: Replace fuse. See "My Clocks are not on time" Pg. 15 to reset clocks as required
NO: Goto Step 5

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TROUBLESHOOTING

"MY CLOCKS ARE NOT MOVING"

4) Is the 99B-MI in "Reset Mode"?

- When in "Reset Mode" the 99B-MI display will alternate every few seconds between the "Running" display (See Pg. 10) and the "Correcting Clock" display (See Pg. 10)

Is the 99B-MI alternating between the "Running" and "Correcting Clock" displays?

YES: Goto Step 6
NO: Goto Step 7

5) Does the 99B-MI know where the clock hands are?

- The "Correcting Clock" display will show where the 99B-MI thinks that the clock hands are currently located (example: "Hands At: 12:00")

Does the "Correcting Clock, Hands At:" display match the current hand position?

YES: Hands will begin moving at correct time within the next 2 hours
NO: See "My clocks are not on time" Pg. 15, Step 3

6) Check wiring

- Verify all wiring is OK from 99B-MI to each clock *Note: this is one of the most common errors when installing the clock controller, be sure to check the wiring at the clock movement and clock control.*

Is wiring OK?

YES: Possible failure of motor or circuit board on clock (CMI PC Board)
Contact Electric Time Company Service Department
NO: Fix wiring, repeat troubleshooting as required

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SERVICE

For assistance in troubleshooting problems with your 99B-MI Clock Controller, or to request service, contact the Electric Time Company Service Department at the address shown below:

Electric Time Company, inc.
Service Department
97 West Street
Medfield, MA 02052 USA

Ph: (508) 359-4396
Fax: (508) 359-4482
Email: service@electrictime.com

DST Change (North America only)

Beginning in the Spring of 2007, the Energy Policy Act of 2005 changed the starting and ending dates of Daylight Saving Time for the United States. As of January 1st 2006 all controls shipped from Electric Time Co. have the updated Daylight Saving Time for 2007 and beyond.

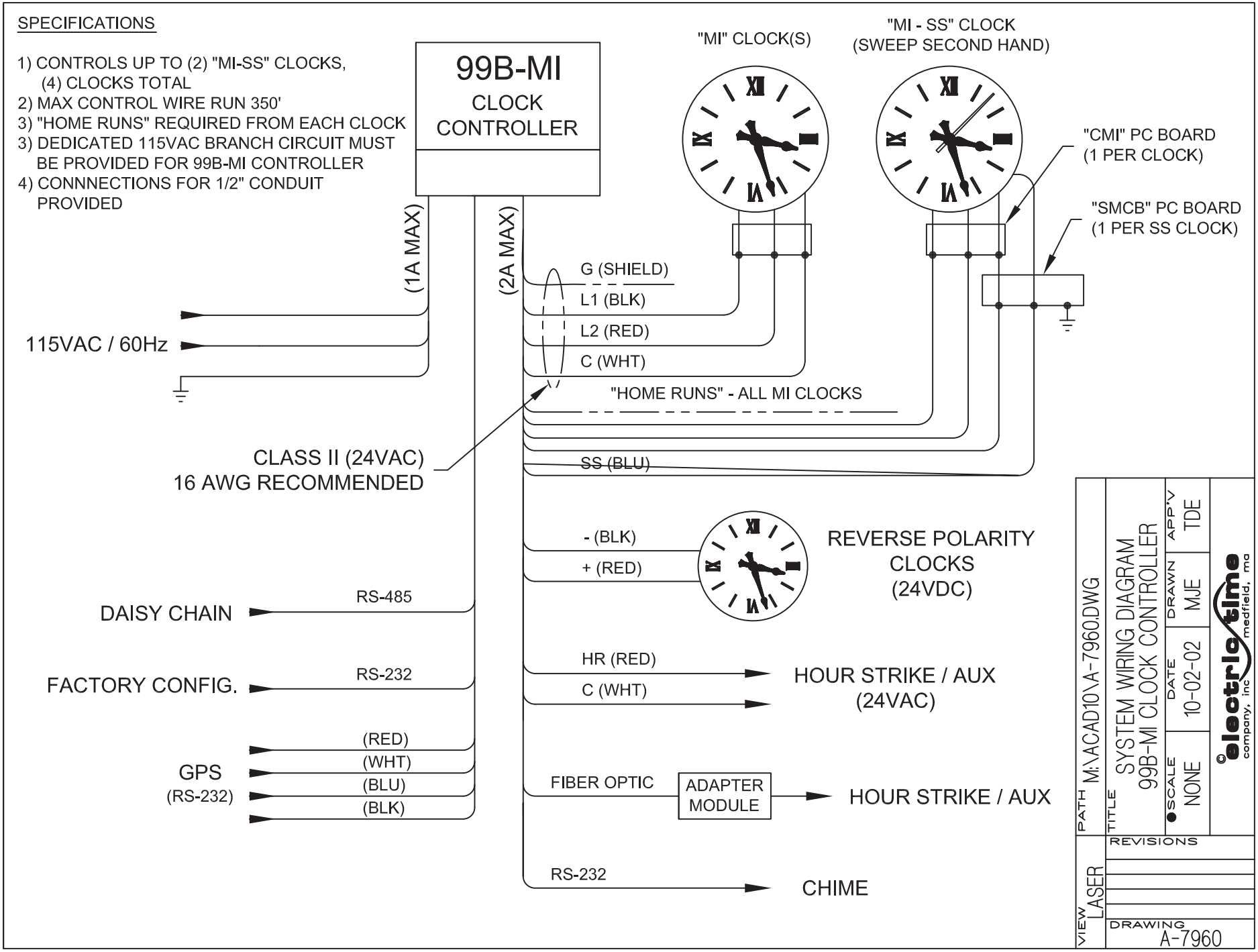
In the event the US Government reverts to the 2005 Schedule or a different DST schedule the 99B-MI clock controller is capable of being reprogrammed with a new DST rule through the user interface. For more details on changing the DST rule please see page 13.

REVISION HISTORY

03-21-03	First Release
07-25-05	Revised
09-14-06	DST table/rule added
06-01-09	“L1/L2 Opt” & “RP Hand Position” added
07-01-15	Wiring Diagram A-7960-1 replaced with A-14425

SPECIFICATIONS

1) CONTROLS UP TO (2) "MI-SS" CLOCKS, (4) CLOCKS TOTAL
2) MAX CONTROL WIRE RUN 350'
3) "HOME RUNS" REQUIRED FROM EACH CLOCK
3) DEDICATED 115VAC BRANCH CIRCUIT MUST BE PROVIDED FOR 99B-MI CONTROLLER
4) CONNNECTIONS FOR 1/2" CONDUIT PROVIDED



PATH M:\ACAD10\A-7960.DWG
TITLE SYSTEM WIRING DIAGRAM 99B-MI CLOCK CONTROLLER
SCALE NONE
DATE 10-02-02
DRAWN MJE
APP'V TDE
electric time company, inc medfield, ma
VIEW LASER
REVISIONS
DRAWING A-7960

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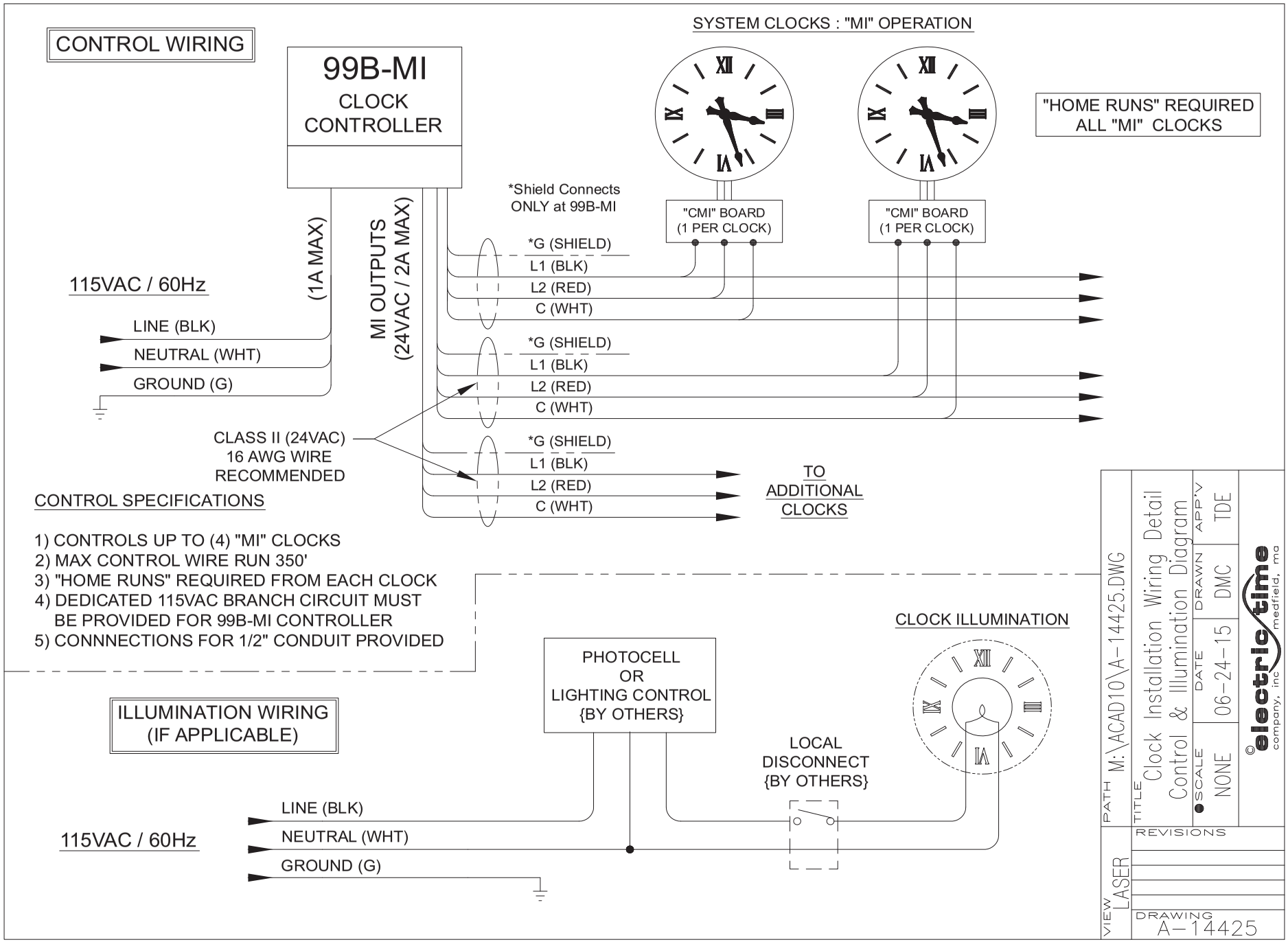

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