LTR4-512
LTR8-512
LTR8-512M

MASTER CLOCK

Installer's Guide

THIS EQUIPMENT COMPLIES WITH FCC CLASS-B REQUIREMENTS
PURSUANT SUBPART J OF PART-15

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe B est conforme a la norme NMB-003 du Canada.

INSTALLER'S GUIDE

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MASTER CLOCK

LATHEM TIME CORP

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Table of Contents

Welcome

This Installer's Guide covers three different Master Clocks. The LTR4-512, the LTR8-512 and the LTR8-512M. All three units are installed and programmed in similar fashions. The main difference between the three units is the LTR4-512 has 4 circuits that can be programmed to ring bells or activate circuits for up to 99 seconds and/or synchronize the time on two types of clock systems (any clock systems types listed in Appendix B, plus RS-485 time sync devices). The LTR8-512 and LTR8-512M have 8 circuits that can be programmed to ring bells or activate circuits for up to 99 seconds and/or synchronize the time on three types of clock systems (any two clock system types listed in Appendix B, plus RS-485 time sync devices). You can program up to 512 events to activate a single or multiple circuits on a given day and time. The LTR8-512 and LTR8-512M can also connect to a PC running Microsoft Windows using the optional LTR MasterLink software. The LTR8-512M has a built in Modem capable of communicating with the PC or for synchronizing with the NIST Atomic Clock.

Unless otherwise specified, LTRx-512 refers to all units. Information that applies to specific units will be noted.

The list below describes the functions that you can set for this Master:

- Passwords
- Date and time
- Clock types to sync
- Manual bell control (example: sounding a fire alarm)
- Bell schedules (with events lasting up to 99 seconds)
- Dates when automatic schedule changes go into effect
- Manual circuit disabling (example: for safety during maintenance)
- Daylight savings time features
- Instant bell schedule changes
- Instant clock synchronization
- Holiday schedules
- Communications when using the LTR MasterLink software with your Master, an RS-485 network or modem access (LTR8-512 and LTR8-512M only)

Parts List

Please check that you received all the parts needed to setup your Master:

- Master Clock (ready to surface mount)
- User's Guide & Installer's Guide
- Installation Hardware Kit

    Package of quick-connects

    Package of mounting screws and 2 extra cover screws

Also included with the LTR8-512 and LTR8-512M

- 2 L-brackets (ears), used to rack mount
- Power supply box cover, used to mount in a rack or with a hidden power supply

Optional parts:

- Connection cable to mount the power supply up to 8 feet from display unit
- LTR MasterLink software to control the Master from a computer (LTR8-512 and LTR8-512M only)
- Internal Modem (LTR8-512 only)
- LTR-RSS Remote Schedule Selector switch (LTR8-512 and LTR8-512M only)
- Rack Mount hardware kit for the LTR4-512

Mounting the Master

The Master comes ready to surface mount on the wall. However, you can also install the Master in a standard 19" rack, recess the power supply into the wall or hide the power supply in the floor or ceiling and hang only the display unit on the wall with optional hardware.

A qualified electrician who understands the electrical code in your area should install your Master. The installation should not require any special tools, but may require extra hardware, wire, etc. as required by your local electrical code.

Surface Mount

Power Supply Box

Wall Mount Cover
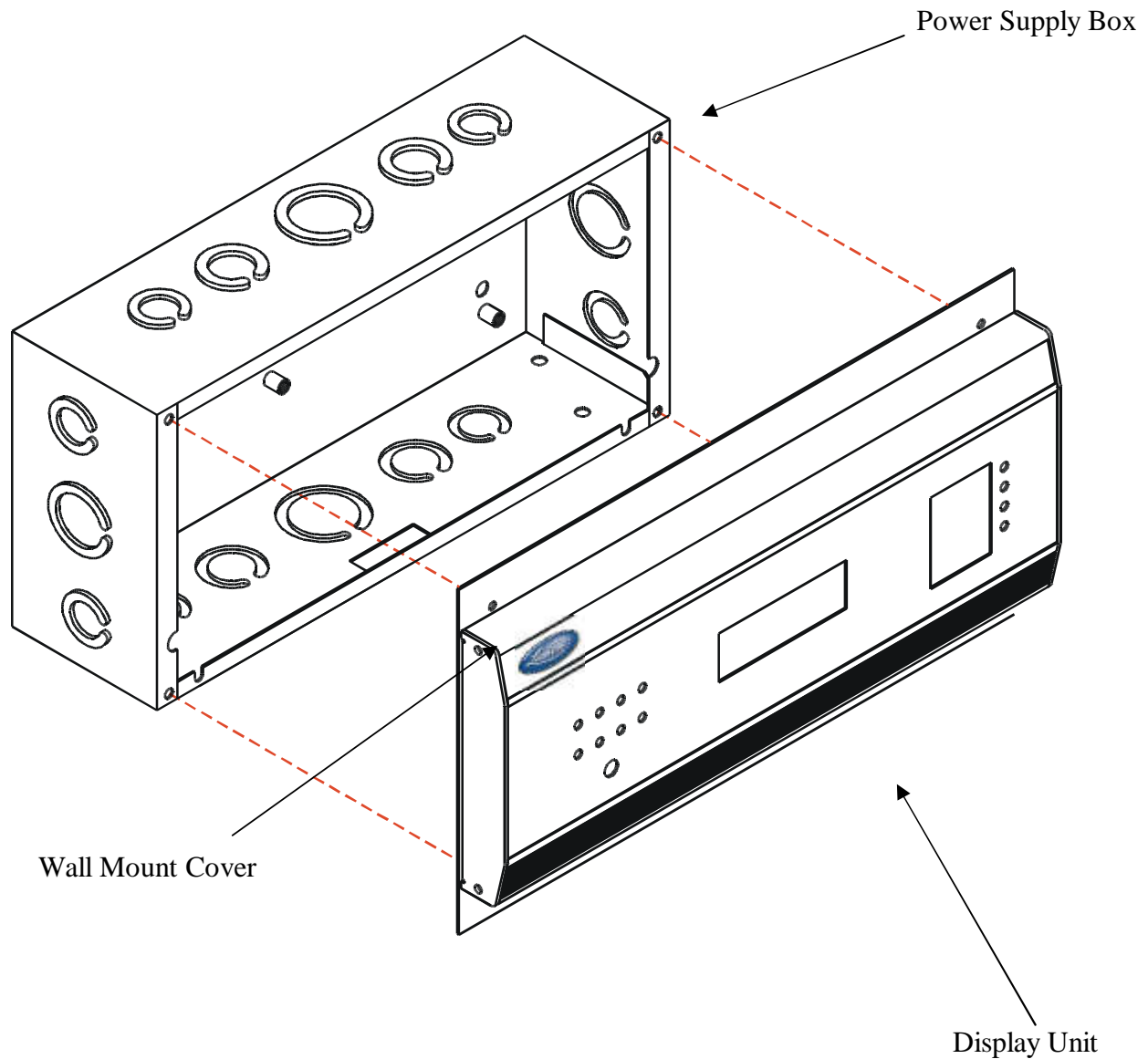
Display Unit

To surface mount the Master

- Place the Master on its back with the display unit facing up and the keypad to the right
- Remove the two screws from just above the display unit
- Lift the display unit up and away from you. Note that two rivets at the bottom of the cover prevent you from lifting it straight up
- Unplug the ribbon power cable from the back of the display unit
- Set the display unit aside
- Place two wall anchors and #8 screws 10 inches apart and level on the wall where you want to mount the Master
- If needed, place two wall anchors 5 inches below the first two screws
- Hang the power supply onto the top two screws using the keyholes on the back
- Screw two more #8 screws through the two holes at the bottom of the power supply into the wall anchors
- Follow the wiring steps in the next chapter
- Reconnect the ribbon cable
- Replace the display unit using the two screws that you earlier removed

Semi-Flush Mount

You can set the power supply portion of the Master into the wall. See the steps below and refer to the Surface Mount drawing to semi-flush mount your Master. A competent electrician should mount the Power Supply Box inside the wall
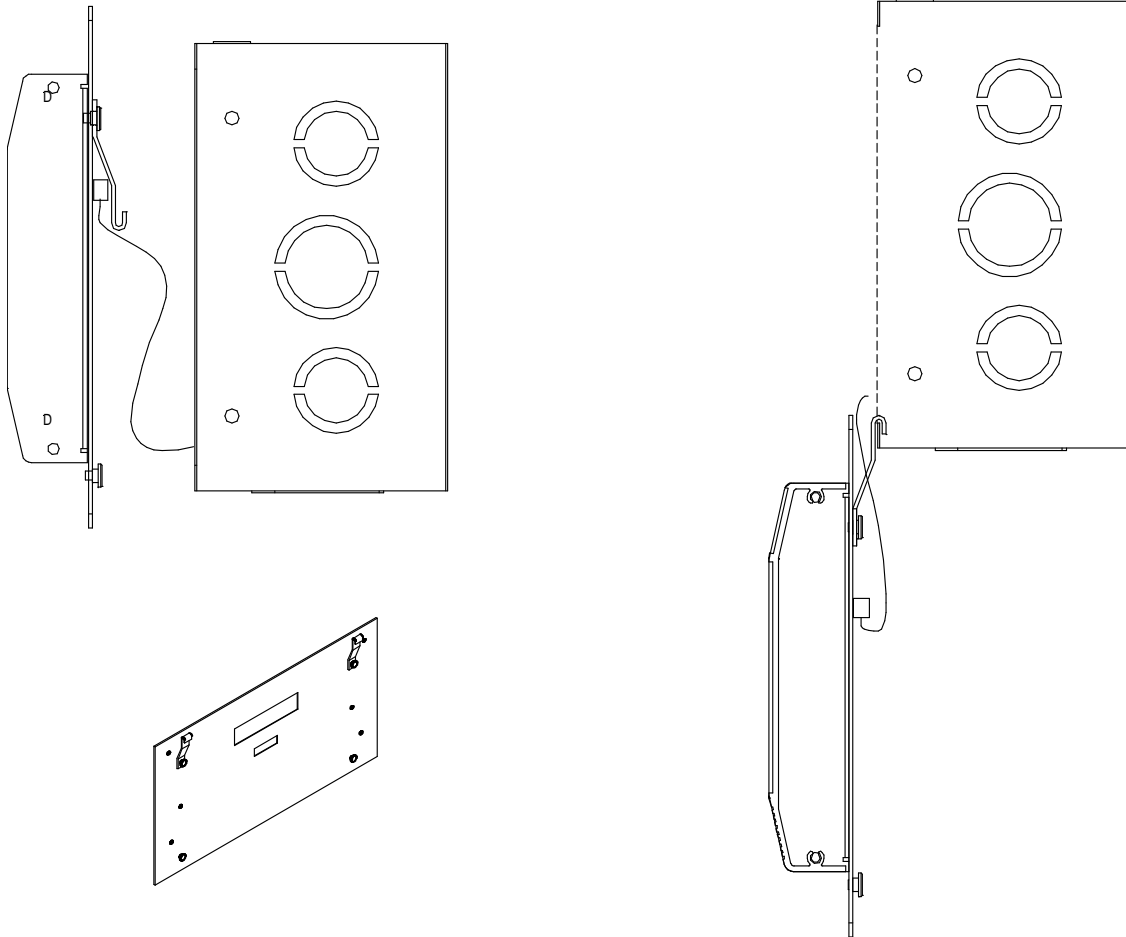
To recess the Master in the wall

- Place the Master on its back with the display unit facing up and the keypad to the right
- Remove the two screws from just above the display unit
- Lift the display unit up and away from you. Note that two rivets at the bottom of the cover prevent you from lifting it straight up
- Unplug the ribbon power cable from the back of the display unit
- Set the display unit aside
- The power supply measures 12" wide x 6" high x 3 3/8" deep. The cover extends ½" around the 12" x 6" dimensions. Cut a hole roughly 12¼" x 6¼" in the wall between two studs where you want to hang your Master
- Cut two blocks of wood for filler and attach them to the studs
- Using the two holes on each side of the power supply, screw it to the blocks
- Follow the wiring steps in the next chapter
- Plug the ribbon cable
- Replace the display unit using the two screws that you earlier removed

Lowering the Display Unit during Testing

With a Semi-Flush or Surface mount, you can hang the display unit below the back box when testing the Master and its circuits. To lower the display unit, remove the two screws that attach the display unit to the back box. Lift the unit up and away from the back box, leaving

the ribbon cable plugged in. For Semi-Flush mounts, remove the green communications plug from the back of the display unit, so it can sit flat against the wall. Swing the two hooks on the back of the unit up and hook them over the bottom edge of the back box. You can use the keypad to turn on circuits or program the Master, as well as access the relay and connector blocks inside the back box

Rack Mount

The LTR8-512 and LTR8-512M come with two L-shaped brackets (optional on the LTR4-512) so you can install your Master in a standard 19-inch rack

Power Supply Box

Brackets
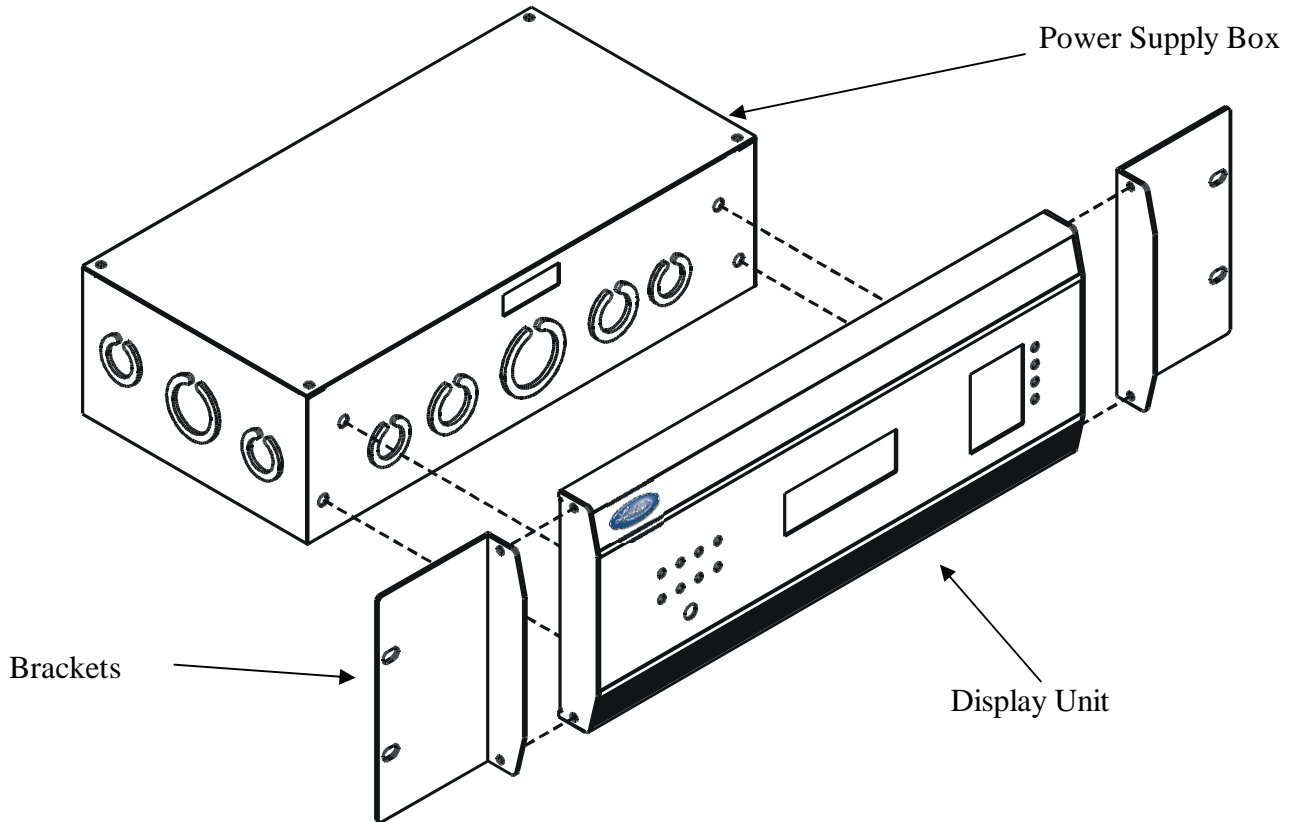
Display Unit

To install the Master in a 19-inch rack

- Place the Master on its back with the display unit facing up and the keypad to the right
- Remove the two screws from just above the display unit
- Lift the display unit up and away from you. Note that two rivets at the bottom of the cover prevent you from lifting it straight up
- Unplug the ribbon power cable from the back of the display unit
- Set the display unit aside
- Detach the display unit from the wall mount cover by removing the 4 screws on the back of the display unit (IMPORTANT: These screws are the correct length so they do not interfere with the circuit board inside the display unit. Using any other screws voids any warranty)
- Remove the rectangular knockout near the top of the power supply
- Using the 4 screws that you removed from the display unit, attach the display unit to the side of the power supply. You can fit a #1 Philips screwdriver with an 8 inch blade through the holes opposite the 4 screw holes
- Plug the ribbon cable from the power supply into the display unit
- Remove the two screws from the side of the display unit

- Using these same screws, attach an "L" bracket (or ear)
- Repeat to attach the other ear
- Mount the unit in the rack
- Follow the wiring steps in the next chapter before attaching the box cover
- Attach the furnished cover to the power supply using four 6-32 screws (two of these screws you removed from the display unit)

Hidden Power Supply Mount

You can hide the power supply portion of the Master above a dropped ceiling, under a raised floor or behind a wall, up to 8 feet away from the display unit. This allows you to hide the cables and gives a more pleasing look to your Master. To mount the Master this way, you must purchase the 8-foot connection cable

Power Supply Box

8 foot cable (optional)

Display Unit
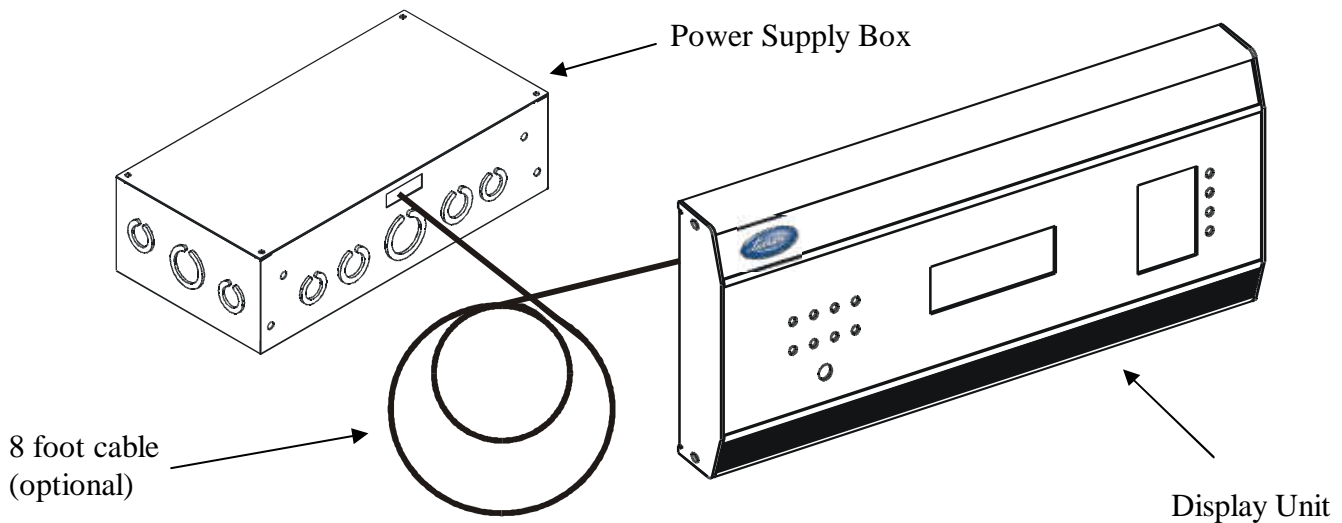
To hide the power supply

- Place the Master on its back with the display unit facing up and the keypad to the right
- Remove the two screws from just above the display unit
- Lift the display unit up and away from you. Note that two rivets at the bottom of the cover prevent you from lifting it straight up
- Unplug the ribbon power cable from the back of the display unit
- Set the display unit aside
- Detach the display unit from the power supply cover by removing the 4 screws on the back of the display unit (IMPORTANT: These screws are the correct length so they do not interfere with the circuit board inside the display unit. Using any other screws voids any warranty)
- Unplug the ribbon cable from the power supply board
- Remove a knockout in the power supply and pass the 8-foot connection cable through it using proper strain relief hardware. When properly installed, the cable will face away from the transformer

Note: UL regulations require that you do NOT place high voltage (120V) and low voltage communication cables in the same conduit or through the same knockout holes

- Follow the wiring steps in the next chapter
- For the cleanest installation, mount the display unit over a standard "double gang" 4-inch electrical box
- Route the other end of the 8-foot connection cable to this electrical box
- Place two #8 screws, 12 inches apart and level, ½-inch down from the top of the electrical box
- Connect the 8-foot connection cable and any communication cables to the display unit
- Check your connections, then turn your Master on using the On/Off switch on the power supply board
- Attach the furnished cover to the power supply using four 6-32 screws (two of these screws you earlier removed from the display unit)

Wiring the Master

- Wire the display panel and power relay units for bell control and clock synchronization. Refer to the diagrams in Appendix D for more details. **Until you complete this part of the wiring, do not turn on the AC power to P4, and keep the power/relay unit's toggle switch turned "OFF"** *(Note: The LTR4-512 does not contain Terminal Block P3)*

POWER SUPPLY

This is terminal block P4. See the drawings below for a closeup of wiring for 120VAC or 220/240VAC
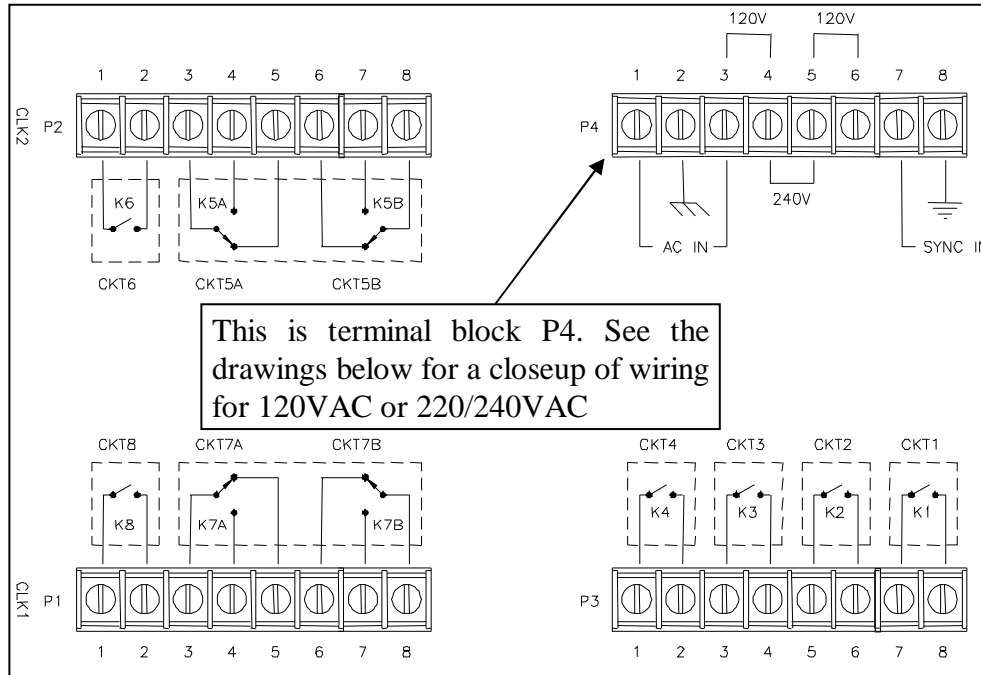
TERMINAL BLOCK 'P4'
WIRING THE LTR8-512
FOR **120VAC** (nom.) OPERATION
J1 installed between 3 & 4 and J2 installed between 5 & 6
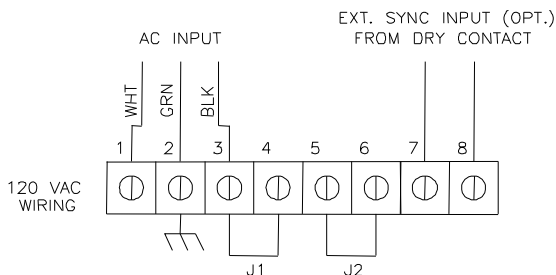
TERMINAL BLOCK 'P4'
WIRING THE LTR8-512
FOR **220/240**VAC (nom.) OPERATION
J1 installed between 4 & 5

- Your Master is already setup for 120VAC operation. If you need to wire it for 220/240VAC, change the jumper settings as shown in the drawings above

- We recommend using stranded wire inside the Power Supply Box. Stranded wire allows for a firm connection to the Quick Connect terminals. Stranded wires are also less likely to interfere with the relay board components. If you must use solid wire, join the stranded wire to the solid wire in another box
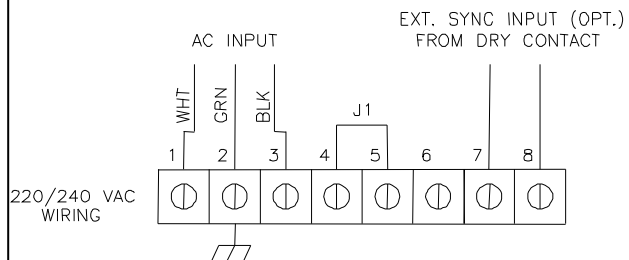
- **Note that applying 220/240 VAC power to a system not setup for that voltage level can severely damage its electronic parts**

- Attach the supplied quick-connects to the wires as needed

- Plug the quick-connects into the terminal block, as shown in the drawings above. **Failure to properly connect the ground wire can increase interference and cause unsafe operating conditions**

- While the Master is fused internally to protect its electronics, you must also fuse the incoming AC line as required by your local electrical code. You should connect the unit to a dedicated 10 Amp circuit. You may need to add external MOV's or diodes to sync a specific clock type – see Appendix D for the wiring diagram of your type clock. Appendix C shows wiring diagrams for bell circuits and communications

- Complete any mounting steps in the previous chapter before turning on the power supply

- Turn the toggle switch in the power supply to the "ON" position. The display may show the message SYSTEM RECOVERY IN PROGRESS" for about 2 minutes, then you will see the date and time

- Fasten the cover to the power supply
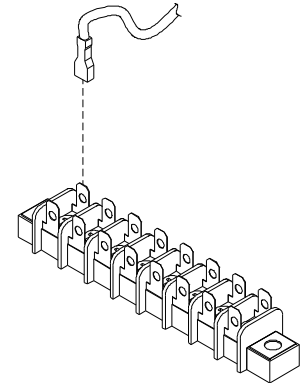
EXTERNAL PULSE-SYNC

Your Master can synchronize to other systems if needed. For example, you have a non-compatible time clock that the Master cannot synchronize, but it has a built-in bell ringer. By shorting terminals 7 & 8 on terminal block P1, or terminals 6 & 7 of the communications terminal on the back of the display unit, the Master will immediately reset to 00:00 (midnight). If you can program the other device to close its circuit at 00:00 (Midnight) then the two systems will remain reasonably in sync. **WARNING:** DO NOT APPLY POWER TO THESE CONNECTIONS – only close the circuit for a short time (Duration must be at least 1, but not more than 2 seconds)

Setting up the Master

If you will use the Master to sync clocks, you must first use relays #7 & #8 (terminal block P1) for synching. If you have an LTR8-512 or LTR8-512M and will use a second clock type, you must use relays #5 & #6 (terminal block P2) for those clocks

Bell Zone #1	Bell Zone #2	Bell Zone #3	Bell Zone #4	Bell Zone #5	Bell Zone #6	Bell Zone #7	Bell Zone #8
Relay #1	Relay #2	Relay #3	Relay #4	Relay #5	Relay #6	Relay #7	Relay #8

                              ---Clock Sync #2---   ---Clock Sync #1---

Here are some suggested ways to program your Master's relays:

1. Eight (8) bell zones that can last from 1 second to 99 seconds. Use this setup if your Master will not synchronize secondary clocks.

2. Six (6) bell zones and one electro-mechanical wall clock sync control. Use this setup if your Master will sync only one type of clock in one string.

3. Four (4) bell zones and two electro-mechanical wall clock sync controls. Use this setup if you will synchronize two clock types, or if you have two strings of clocks (typically 20 to 35 clocks to a string).

The steps below lead you through getting the Master up and running.

Enter your Password

- The user password allows you to access user functions, but you must use the administrator password to access advanced functions. You can change the user password, but you cannot change the administrator password. To keep the administrator functions secure, only give this guide to authorized personnel. You can learn more about user passwords in the User's Guide. All factory programmed passwords can be spelled out using the letters of a telephone keypad. For example, the administrator password is 332537 or DEALER.

  Enter the administrator password '332537' [DEALER]

Press	Display
[#]	SELECT FUNCTION CODE
[0]	[0]=ENTER PASSWORD
[#]	PASSWORD: 000000

```
[3][3][2][5][3][7]    PASSWORD:       332537

[#]                      ADMINISTRATOR
                      PASSWORD ACCEPTED
```
Return to time and date display after 3 seconds

Note that if you stop using the keypad for over 5 minutes, you must re-enter your password

Set the Date and Time

- Use Function [1] to set the date and time

Press	Display
[#]	`SELECT FUNCTION CODE`
[1]	`SET DATE/TIME`
[#]	`ENT.DATE: MM-DD-YYYY`
[0]..[8]	Enter the numbers for the month, date and year (4-digit year)
[#]	Press [#] to move to the second line

[1]..[7]	`ENTER DAY-OF-WEEK:  D`
	`1=SUNDAY..7=SATURDAY`
	Enter a number [1] - [7] for the day of the week,
	Sunday through Saturday

[#]	Press [#] to accept (or [*] to cancel and try again)
[0]..[8]	`ENTER TIME:    HH:MM` Enter the time of the **next upcoming minute**, using 12-hour or 24-hour format, then press [#]. (If using 24-hour format, enter midnight as 00:00)
[0] or [1]	If you enter a time less than 13:00 (1:00 PM), you will see `SELECT [0]PM / [1]AM`
[#]	`PRESS [#] IF CORRECT` Press [#] at the top ('00' seconds) of the new minute to accept, or press [*] to cancel and try again

Enable the Relays

- Use Function [6] to enable any control relays that you want to use

The Enable Circuits function only enables you to use certain relays. It does not turn them on. Use Function [3] or [4] to actually turn on these relays

Press	Display
[#]	SELECT FUNCTION CODE
[6]	[6]=ENABLE CIRCUITS
[#]	SELECT ACTIVE BELL ZONES 12345678 CLOCK CKTS PRESS [#] IF CORRECT
[1]..[8]	Enter the circuit numbers that you want to turn on or off. When you see the circuit numbers you want on, press [#]

Choose the Clocks to Synchronize

- If you will use the Master to synchronize electro-mechanical wall clocks (analog or digital), then use Function [2] to choose the clock type for Clock #1 and/or Clock #2

NOTE: You do not need to enter any special setup to make the Master synchronize Lathem time sync devices (DDC4R, LTR-0, DWA-S and OMC2) using the Master's RS-485 SYNC ports

Press	Display
[#]	SELECT FUNCTION CODE
[2]	[2]=SELECT CLOCK CTL
[#]	ENABLE CLOCK CIRCUIT SELECT CLK1 CODE: NN [#] FOR CODE LIST
	To see the code list, keep pressing [#] and make note of the code number for CLOCK1 and CLOCK2
[0]..[9]	Enter the 2-digit code for CLOCK1, then press [#]

[#]	`SYSTEM TYPE CODE:    NN`
	If you are using an LTR8-512 or LTR8-512M and you chose a CLOCK1 type other than 00, you will see
	`SELECT CLK2 CODE:    NN`
[0]..[9]	Enter the code for CLOCK2, or 00, if none
[#]	`PRESS [#] IF CORRECT`
[#]	Press [#] to accept
	-or-
[*]	Press [*] to cancel and try again

Manual Bell Control

- Use Function [3] to manually turn on bell circuits

Press	Display
[#]	`SELECT FUNCTION CODE`
[3]	`[3]=MANUAL BELL CTRL`

[#]	`MANUAL BELL CONTROLS`
	`    1-2-3-4-5-6-7-8`
	`  PRESS AND HOLD [#]`
	`TO EXECUTE.[*]TO END`

[1]..[8]	Enter the circuit numbers that you want to test. When you see the circuits you want, press and hold [#]. Those circuits will turn on their relays, as shown by the green panel lights. When you release the [#], the circuits will turn off their relays. You can now choose and test other circuits or press [*] to quit *Note: Only circuits setup as Bell Zones will appear. If you have an LTR8-512 with a single clock system attached, you will only see circuits 1-6. If you have an LTR4-512 with a single clock system attached, you will only see circuits 1-2*
[*]	Return to time and date display

Auto Test the Bells

Use the Auto Bell Test feature to turn on all bell relays once per minute at the start of each minute. Once you start this function, you can test the continuity of your bell wiring circuits. Use the "hidden code" 2355878 [BELLTST] to start the Auto Bell Test. When you enter this code, ignore anything that displays on the screen

Use Function [6] to disable any relays that you do not want to use in your testing

Once you finish testing, make sure you enter the hidden code again to stop the Auto Bell Test and use Function [6] to enable any relays that you earlier disabled

Set Daylight Savings

- Your Master comes set to adjust for daylight savings in the United States. If you live outside the United States or if your region does not observe daylight savings, use Function [7] to change the country code

Press	Display
[#]	SELECT FUNCTION CODE
[7]	ENTER COUNTRY CODE FOR DAYLIGHT SAVINGS TIME ADJUSTMENT: 08
[0]..[9]	Enter your country code from Appendix C
[#]	Press [#] to accept (or [*] to cancel)

If your region does not observe daylight savings, then set your country code to 00

Setup Communications (LTR8-512 and LTR8-512M only)

- Use Function [B] if you use the LTR MasterLink or Terminal Manager software with your Master. You can setup your LTR8-512 with LTR MasterLink using RS-232 (serial), RS-485 (networked) or Modem (remote) Communications

You must enter these same settings for your LTR8-512 in the Terminal Manager or LTR MasterLink software

You cannot choose function [B] directly. To enter Communications, press [#][9][0][0][#]

Press	Display
[#]	SELECT FUNCTION CODE
[9]	Press [9], then
[0][0]	Press [0] twice to see [B]=COMMUNICATIONS

[#]	COMMUNICATIONS SETUP
	   SELECT BAUD RATE:
	  [2]400 -OR- **[9]**600

[2] or [9]	Enter [2] for 2400 baud or [9] for 9600 baud (9600 is the default) 9600 (or 2400) BAUD SELECTED ENTER TERM ID# 000 *Note: If the LTR8-512M will be programmed to call the NIST Atomic clock, you must select 9600 Baud.*
[0]..[9]	Enter a *unique* Terminal ID # from 001-127 (065 is the default)
[3]	PRESS [#] TO CONFIRM
[#]	Press [#] to accept
	-or-
[*]	Press [*] to cancel and try again

Congratulations! You have finished the basic setup of your LTRx-512 Master. All of the Master functions are described in the next section of this guide, such as setting up your bell schedules. For detailed information, please refer to the User's Guide.

The Master will exit itself out of Program Mode once you stop using the keypad for 5 minutes or if you wish to exit programming mode immediately to prevent others from accessing the Master Clock, simply enter an invalid password. (For example)

[#]	SELECT FUNCTION CODE
[0]	[0]=ENTER PASSWORD
[#] 99 [#]	PASSWORD: 99

Functions Defined

[#]   Starts the Programming Functions and Confirms Entries
[*]   Ends Program functions and/or Cancels Entries (except the "Quick Check")

Quick Check Commands

Quick Check commands display system information for about 2 seconds. You can press any of the three quick check keys ([*], [1] or [3]) when the Master is in Clock Mode.

Quick Check Command [*] Status

Any time you see the time and date, you can press [*] to see the Master status. You will see the firmware version, terminal ID#, communications baud rate, time display format (12-hr or 24-hr), daylight savings country code and the clock types you have chosen

Quick Check Command [1] Edit Keys

Any time you see the time and date, you can press [1] to see the edit key descriptions. You can use the edit keys to program Bell Schedules, Automatic Schedule Change Dates, and Holiday Dates. When you press [1], you will see

```
[1] EDIT      [9] 1ST
[3] PRV       [#] NXT
[4] DEL       [*] EXIT
[6] ADD
```

Quick Check Command [3] 12/24 Hour Display

Any time you see the time and date, you can press [3] after entering your password to toggle the time and date between 12-hour and 24-hour format. The 12-hour format shows AM or PM, while the 24-hour format shows the day of the week (or 'HO' for Holiday).

Program Keys

To access the Master's programming functions, press the [#] key. As described below, some functions require a user password, and advanced functions require the administrator password.

[0] = Password

You must enter a password for most programming functions. To enter your password, press [#][0][#]

Enter your 6-digit password, then press [#]

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Once you enter your password, you can now program your Master until it detects that you haven't pressed a key for 5 minutes. After that, you must re-enter your password to keep programming

The administrator password 332537 [DEALER] allows you to access advanced functions. Functions that require the Administrator Password are [2] Select Clock Control, [6] Enable Circuits, [7] Daylight Savings, and [B] Communications

The default user password is 000000. See Function [C] Change Password to learn how to change your user password. You cannot change the administrator password

[1] = Set Date and Time

To set the date and time, enter your password, then [#][1][#]

[2] = Select Clock Control

This function requires the administrator password

Use this function to choose the clock makes and models that the Master will synchronize. To start this function, enter your password, then press [#][2][#]

Appendix B lists the type codes. If you do not have the printed list handy, keep pressing [#] to scroll through the list on the display. As you scroll, make note of the codes for *both* CLOCK1 and CLOCK2 (if needed). Enter the 2-digit code for CLOCK1, then press [#]

[3] = Manual Bell Control

This function does not require a password

Use this function to test bell circuits or to manually ring a bell. Press [#][3][#] to start this function

You will know that your circuits have turned on when the green front panel lights for those circuits light up

[4] = Program Schedules

Use this function to set bell schedules. Enter your password, then press [#][4][#] to start programming schedules.

[5] = Schedule Changes

Use Schedule Changes to run schedules at a certain date and time. This function works much like the Bell Schedule Function [4]. Enter your password, then press [#][5][#]. You can program up to 16 changes at a time

[6] = Enable or Disable Circuits

This function requires the administrator password

Use this function to **Enable** and **Disable** bell relays during circuit wiring or maintenance. *This function can also 'hold back' clocks to manually adjust for daylight savings in the fall if you do not use the Daylight Savings function [7]*

Disabled relays will ignore any schedules, and you cannot manually turn them on ([3]=MANUAL BELL CTRL). After you complete and check your system wiring, use this function to enable those circuits, so that they will turn on when called. Enter your password, then press [#][6][#]

[7] = Daylight Savings Time

This function requires the administrator password

Your LTRx-512 knows the daylight savings time (DST) settings for over 75 countries. By using the 2-digit "country code", your LTRx-512 will automatically adjust for daylight savings time. If your nation does not appear in the Country Code list, you can choose code '00' and use Lathem's LTR MasterLink software to program when clock adjustments should occur

Enter your password, then press [#][7][#]

Enter your country code from the list in Appendix C or press [9] to see the list. Press [9] to jump to each letter in the alphabet, then press [#] to scroll through the codes. (*example: press [9] to jump to* 08: **B**AHAMAS, BERMUDA, *press [9] again to jump to* 08: **C**ANADA, *press [9] again to jump to* 02: **D**ENMARK *and so on*). When you see your country code, enter it, then press [#]

If your region does not observe daylight savings, then leave the country code at 00

[8] = Change Schedule

Use this function to override any active bell schedules that you setup in function [5]=SCHEDULE CHANGES. Or, you can use this function to instantly run a schedule that you

setup in function [4]=PROGRAM SCHEDULE. Enter your password, then press [#][8][#] to change a schedule

[9] = Sync Clocks

Use this function to quickly synchronize any secondary clocks. This function is primarily used during initial installation or if power to your LTRx-512 stayed on while power to the secondary clocks stopped.

Enter your password, then press [#][9][#]

[A] = Program Holidays

You can enter up to 16 dates as holidays in your LTRx-512. During holidays, only the events that you set to occur on holidays will turn on when they reach the scheduled time

You cannot choose Function [A] directly. To start the Program Holidays function, enter your password, then press [#][9][0][#]

[B] = Communications (LTR8-512 and LTR8-512M Only)

This function requires the administrator password

You cannot choose function [B] directly. To enter Communications, press [#][9][0][0][#]

You must enter these same settings for the Master in Lathem's Terminal Manager or LTR MasterLink software

[C] = Change Password

Use this function to change the default user password (000000) to a unique 6-digit number to prevent unauthorized access to the LTRx-512's programming functions. You should keep a copy of this password in a safe place

You cannot choose function [C] directly. To start the Change Password function, enter your current password, then press [#][9][0][0][0][#]

[D] = Time Calibration (Available with Firmware Version 5.02)

The Crystal Oscillator that provides the Time Base for the Master Clock is optimized for operation at 25' C / 75'F, where it will exhibit its highest accuracy. Due to natural aging of the crystal and to installation of the Master Clock in locations that do not maintain close temperature control, the frequency of the Time-Base is apt to drift from its calibrated value, causing some deterioration in timekeeping accuracy. Use this function to calibrate the oscillator to achieve maximum timekeeping accuracy within your environment.

You cannot choose function [D] directly. To start the Time Calibration function, enter the Administrator Password, then press [#][9][0][0][0][0][#].

The following screen will be presented:

        CALIBRATE TIME-BASE
        SELECT: 0 = NORMAL   *   Note: '*' indicates initial mode
              1 = FASTER
              2 = SLOWER

To set the Oscillator to the factory default frequency, press [0]. The display will show:

        TIME-BASE NORMAL
        SELECT: 0 = NORMAL   *
              1 = FASTER
              2 = SLOWER

If the Master Clock has been running 'slow", you can make the oscillator run faster by pressing [1]. You may repeatedly press [1] to increase the adjustment. The display will show the following, where 'NN' is the amount of positive adjustment applied: Each positive step represents a correction of approx. 10.7 seconds / month. With a maximum adjustment of +31 steps, this represents correction of up to +5.5 minutes / month.

        TIME-BASE FASTER +NN
        SELECT: 0 = NORMAL   *
              1 = FASTER
              2 = SLOWER

If the Master Clock has been running 'fast", you can make the oscillator run slower by pressing [2]. You may repeatedly press [2] to increase the adjustment. The display will show the following, where 'NN' is the amount of negative adjustment applied: Each negative step represents a correction of approx. -5.35 seconds / month. With a maximum adjustment of -31 steps, this represents correction of up to -2.75 min. / month.

        TIME-BASE SLOWER -NN
        SELECT: 0 = NORMAL   *

1 = FASTER
2 = SLOWER

To exit the Time-Base Calibration procedure, press either [#] or [*].

> EXAMPLE: During installation, set the Master Clock's time to match an accurate reference (Cell Phone display, Computer Network Time, WWVB Radio Clock, etc.). At the end of one month, compare the Master's time against the Reference Time, to determine accuracy. If the Master were, say, 32 seconds slow, then calculate required positive correction as 32 / 10.7 = 2.99 ~ 3. Set the correction to "FASTER + 03".

Auto Bell Test

No password is required for this function

Use the Auto Bell Test feature to turn on all bell relays once per minute at the start of each minute. Once you start this function, you can test the continuity of your bell wiring circuits. Use the "hidden code" 2355878 [BELLTST] to start the Auto Bell Test. While entering this code, ignore anything that displays on the screen

Use Function [6] to disable any relays that you do not want to use in your testing

Once you finish testing, make sure you re-enter the hidden code to stop the Auto Bell Test and use Function [6] to enable any relays that you earlier disabled

APPENDIX A - SPECIFICATIONS

ELECTRICAL:

Input Voltage	120 or 220 / 240 VAC @ 60Hz or 50Hz
Input Power	50 VA max (less than 0.5A @ 120V)
Memory / Quartz Time Backup	10 year (nom.) Lithium Battery
Bell / Clock Control Relays	120VAC / 28VDC, 10A , Pluggable
Fuse	1 x 1.0 Amp Main (AGC1)

MECHANICAL / ENVIRONMENTAL:

Operating Temperature	32°-175° F (0°-80° C)
Weight	About 12 lb. (depending on configuration)
Dimensions	See configuration drawings
Mounting Options	Semi-Flush, Surface, 19" Rack, Hidden Power Supply (some configurations optional)

FUNCTIONAL:

Secondary Clocks Supported	Any two (2) of twenty-four (24) types *plus* Lathem DDC4R synchronization built-in; See Appendix B.
	One (1) of twenty-four (24) types *plus* Lathem DDC4R synchronization built-in; on the LTR4-512
Bell Zones and Schedules	Up to eight (8) zones [*less* two (2) for each electro-mechanical secondary clock type]. {Up to four (4) zones on the LTR4-512.} Eight (8) Schedules, *each* allowing sixty-four (64) multi-function events.
Daylight Savings Time	Supports DST standards for over 75 countries. See Appendix C.

COMMUNICATIONS: (LTR8-512 and LTR8-512M)

Remote Communications with Lathem LTR MasterLink, Terminal Manager and "Atomic Clock"	RS-232 point-to-point @ 2400/9600 Baud RS-485 multi-drop network Internal modem (option) dial-in / dial-out
Clock / Master Synchronization using DDC4R Protocols or Midnight Impulse	RS-485 Sync-In/Out Port @ 9600 Baud RS-485 Sync-Out Port @ 9600 Baud Dry-contact input

REGULATORY:

Certifications / Registrations	FCC Part15-ClassB, UL, cUL, CE FCC Part 68 / Canada ICES-003 - Class B CE

APPENDIX B – DAYLIGHT SAVINGS COUNTRY CODES

ALBANIA	02	ENGLAND	01	MALTA	02
ANDORRA	02	ESTONIA	02	MONACO	02
ARMENIA	02	FALKLAND ISLANDS	10	NETHERLANDS	02
AUSTRIA	02	FINLAND	02	NEW ZEALAND	11
AZERBJAN	02	FRANCE	02	NORWAY	02
AZORES	02	GERMANY	02	POLAND	02
BAHAMAS	08	GIBRALTER	02	PORTUGAL	02
BALEARIC ISLANDS	02	GREECE	02	ROMANIA	02
BELARUS	02	GREENLAND	07	RUSSIA	02
BELGIUM	02	HAITI	07	SAN MARINO	02
BERMUDA	08	HUNGARY	02	SCOTLAND	02
BOSNIA/HERCGVENA	02	IRAN	02	SLOVAKIA	02
BRAZIL	13	IRAQ	03	SLOVENIA	02
BULGARIA	02	IRELAND	02	SPAIN	02
CANADA	08	ISRAEL	04	SWEDEN	02
CHANNEL ISLANDS	01	ITALY	02	SWITZERLAND	02
CHILE	12	JAMAICA	08	SYRIA	03
CROATIA	02	JORDAN	05	TURKEY	02
CUBA	06	KAZAKHSTAN	02	UKRAINE	02
CYPRUS	02	KURGYZSTAN	02	UNITED KINGDOM	02
CZECH REP	02	LATVIA	02	UNITED STATES	08
DENMARK	02	LEBANON	02	VATICAN CITY	02
EASTER ISLAND	02	LIECHTENSTEIN	02	YUGOSLAVIA FED.	02
EGYPT	09	LUXUMBOURG	02		
USER-SPEC. DATES	00	UNDEFINED	14		

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01   Last Sunday in March, 3rd Sunday in October
02   Last Sunday in March, last Sunday in September
02   Last Sunday in March, last Sunday in September
03   First day of April, Last day of September
04   First Friday in April, First Sunday in September
05   First Friday in April, third Friday in September
06   First Sunday in April, First Saturday in October
07   First Sunday in April, Last Sunday in October
08   Second Sunday in March, First Sunday in November
09   First day of May, Last day of September
10   Second Sunday in September, Third Sunday of March
11   First Sunday of October, Third Sunday of March
12   Second Sunday of October, Second Saturday of February
13   Third Sunday of October, Second Sunday of February
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APPENDIX C - SECONDARY CLOCK TYPE CODES

Type	Description	Page	Type	Description	Page
01	SYNCHRONOUS WIRED	26	05	3W MIN IMPULSE/58	28
01	LATHEM TYPE SS	26	06	SYNCHRONOUS WIRED	29
01	CINCINNATI D10	26	06	CINCINNATI D8	29
01	IBM 77 SERIES	26	06	FARADAY	29
01	SIMPLEX 77 SER	26	06	HONEYWELL ST402A	29
01	SIMPLEX 93-9	26	07	DUKANE 24F200 DIG	28
01	SIMPLEX 91-9	26	07	DUKANE 24F750	
01	SIMPLEX 941-9	26	08	RAULAND 2410 DIG	30
01	SIMPLEX 943-9	26	09	SIMPLEX 2 MTR /59	30
01	SIMPLEX 6310-9231	26	10	SIMPLEX 2 MTR /45	30
01	STANDARD EL D10,D12	26	11	EDWARDS DUAL MOTR	31
01	STROMBERG 3000	26	12	CINCINNATI D6	31
02	3W MIN IMPULSE/59	26	14	ELECTRONIC CODED	32
02	LATHEM ISC 2W/3W	26	15	STRAIGHT FREQ.	33
02	CINCINNATI D2-D4	26	16	IMPLS 12HR COR/59	34
02	DUKANE 24 SERIES	26	17	STANDARD TM AR2/3	35
02	EDWARDS IMPULSE	26	18	NATNL SYNC WIRED	36
02	FARADAY IMPULSE	26	18	DUKANE 240 SERIES	36
02	IBM 75 SERIES	26	19	STMBRG SYN WIR/56	36
02	SIMPLEX 74 SER	26	19	LATHEM SS MODIF.	36
02	SIMPLEX 91-4	26	20	3W MIN IMPULSE/44	37
02	SIMPLEX 93-4	26	21	CINCINNATI D1	37
02	SIMPLEX 941-4	26	22	DUKANE SYNC WIRED	38
02	SIMPLEX 943-4	26	23	CONDOR 2412 DIG	38
02	SIMPLEX 6310-9075	26	23	RAULAND 2422 DIG	39
02	STANDARD IMPULSE	26	23	CONDOR BAR-AC-4412	40
02	STROMBERG IMPULS	26	24	EDWARDS SYNC E-1	41
03	STANDARD EL SYNCH	27	25	SPECIAL TEST	
03	AMR T&S X55BHGA801	27	27	SIMPLEX 2310 DUAL MT	30
04	STANDARD TM AR-2A	28			

WIRING SECONDARY CLOCKS

TYPE 01 -   SYNCHRONOUS WIRED

TYPES INCLUDE:	Lathem	Type SS Wall Clocks
	Cincinnati	D10 (115VAC), D12 (24VAC)
	IBM	77 Series
	Simplex	77 Series, 93-9, 91-9, 941-9, 943-9, 6310-9231
	Stromberg	3000
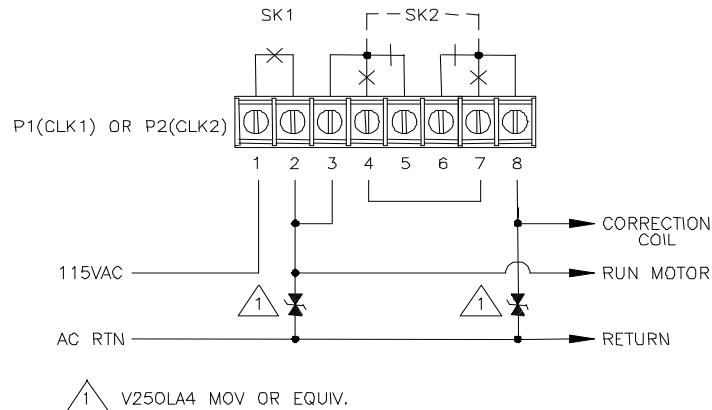
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 02 -   THREE WIRE MINUTE IMPULSE (59TH MIN.)

TYPES INCLUDE:	Lathem	Type ISC (3-Wire)
	Cincinnati	D2, D4
	Edwards	Impulse
	Faraday	Impulse
	IBM	75 Series
	Simplex	74 Series, 91-4, 93-4, 941-4, 943-4, 6310-9075, 6310-9231
	Standard	Impulse
	Stromberg	Impulse
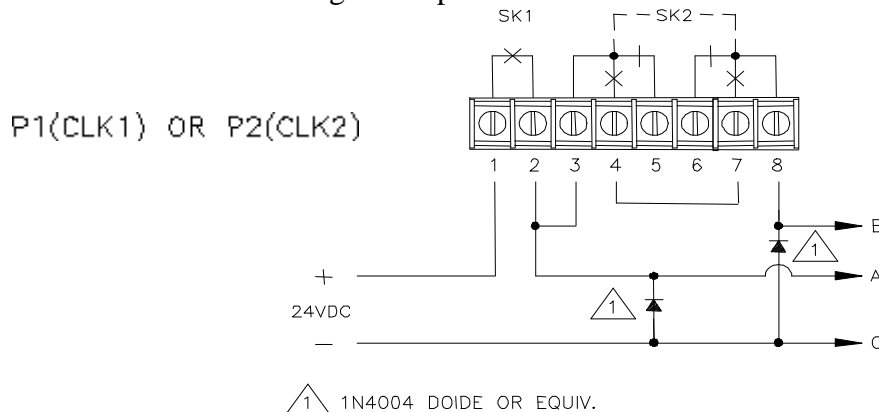
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 02 -   TWO WIRE REVERSE POLARITY MINUTE IMPULSE (59TH MIN.)

TYPES INCLUDE: Lathem   Type ISC (2-Wire)
                 Cincinnati   D3
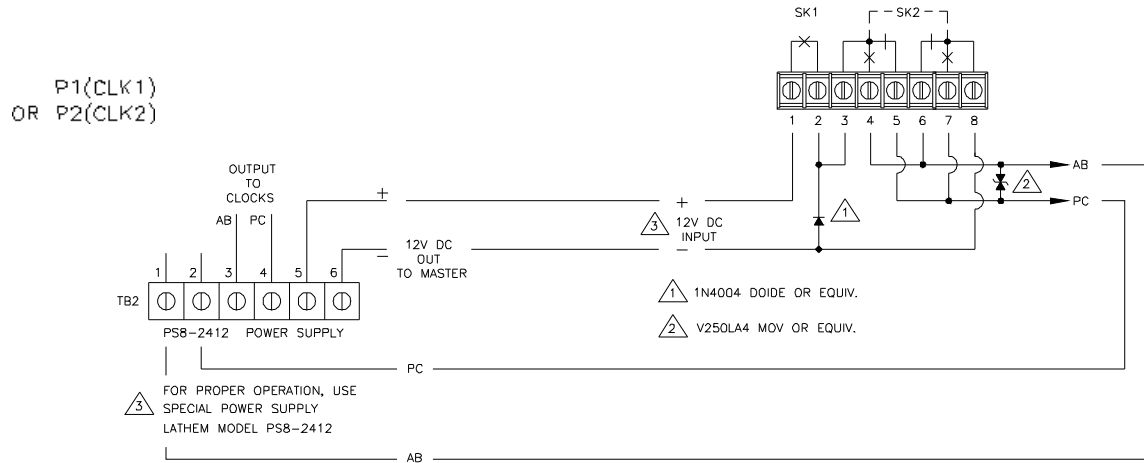
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 03 -   STANDARD ELECTRIC SYNCHRONOUS (*Old Style: Dual Motor)
            AMERICAN TIME & SIGNAL #X55BHGA801
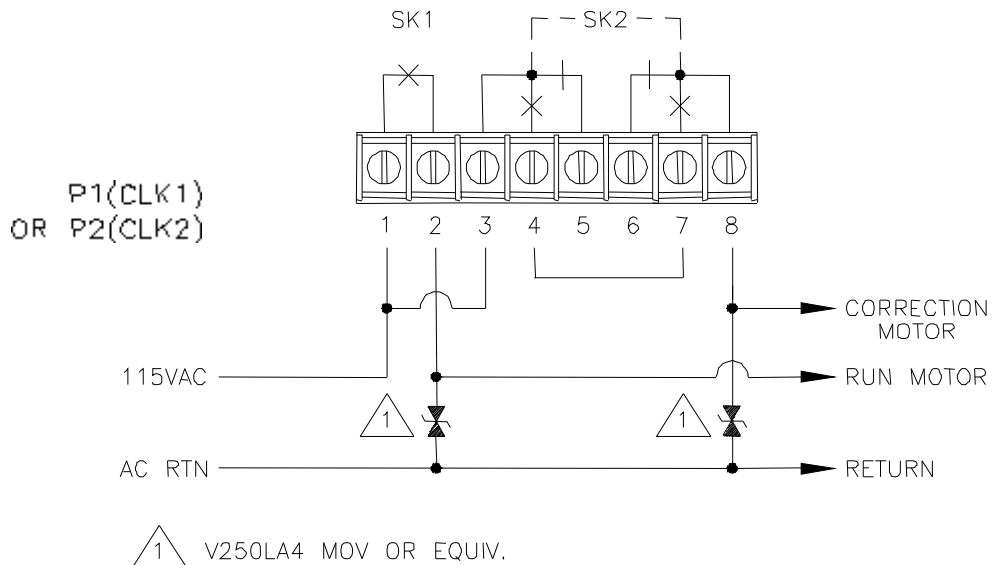
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

Note: For New Style (Motor+Solenoid), see Type 06 (Faraday)

TYPE 04 - STANDARD ELECTRIC TIME AR-2A TWO WIRE DUAL VOLTAGE

1. 1N4004 DOIDE OR EQUIV.
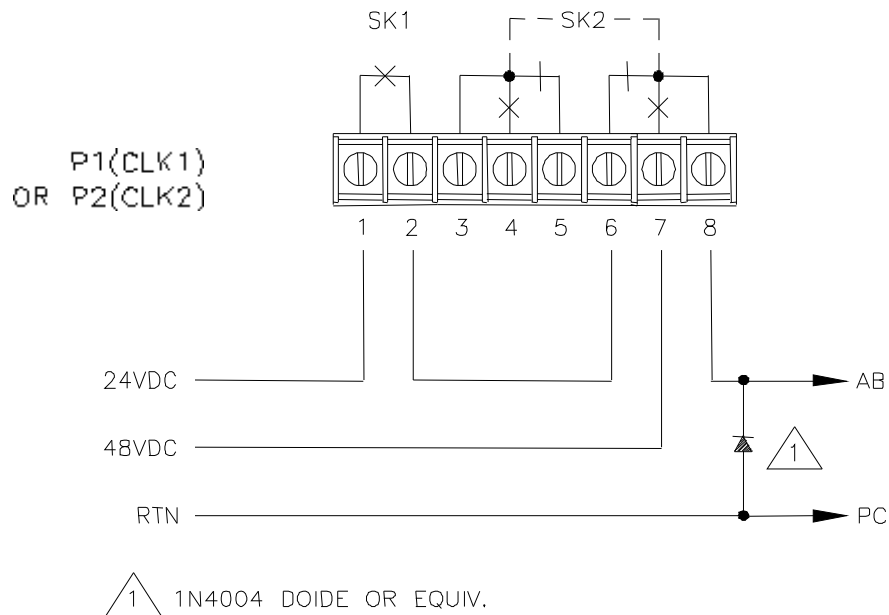
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 05 - THREE WIRE MINUTE IMPULSE (58TH MIN.)

1. 1N4004 DOIDE OR EQUIV.
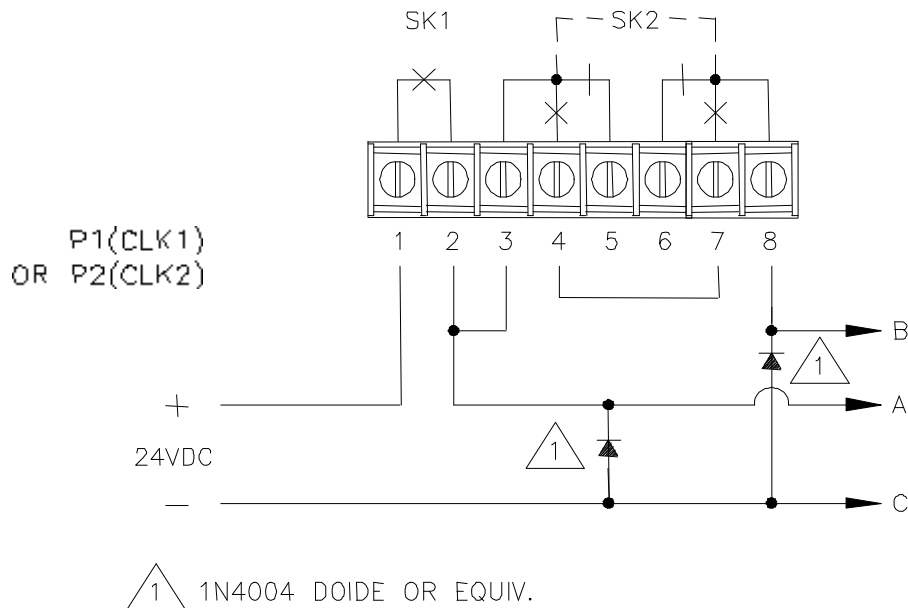
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 06 -   SYNCHRONOUS WIRED

TYPES INCLUDE: Cincinnati   D8
Faraday   (New Style: Motor + Solenoid)
Honeywell   ST402A
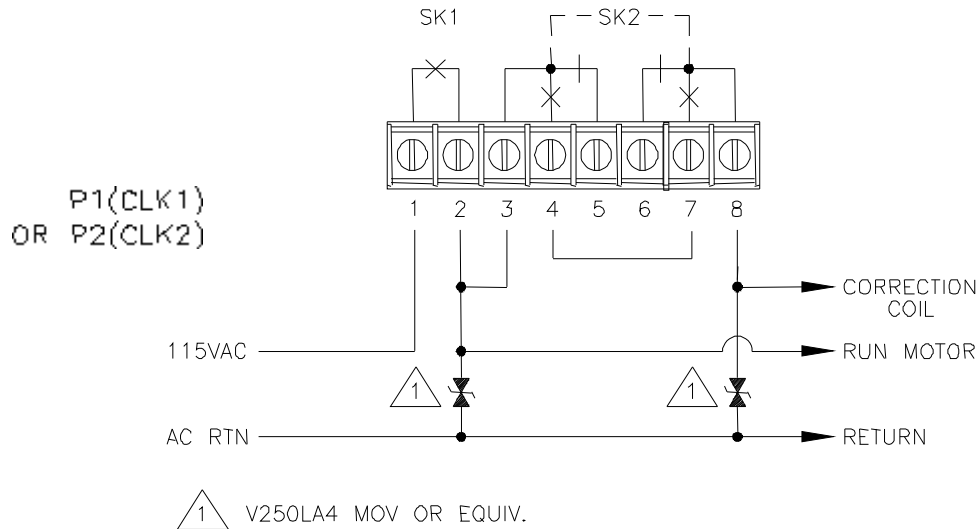
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 07 -   DUKANE 24F200 DIGITAL CLOCKS
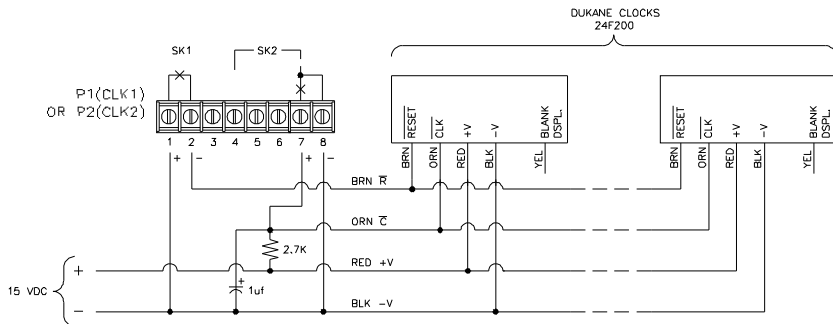
NOTE: THIS SELECTION IS NOT SUPPORTED ON THE LATHEM LTR8-512 OR LTR4-512 SERIES. CORRECTION FOR DUKANE 24F200 DIGITAL CLOCKS IS AVAILABLE ON THE DUKANE 24A715 SERIES MASTER CONTROL WITH SOLID-STATE RELAYS. CONTACT DUKANE CORPORATION OR YOUR DUKANE VENDOR.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 08 -   RAULAND 2410 DIGITAL CLOCKS (24VAC and 115VAC)

115VAC TYPE
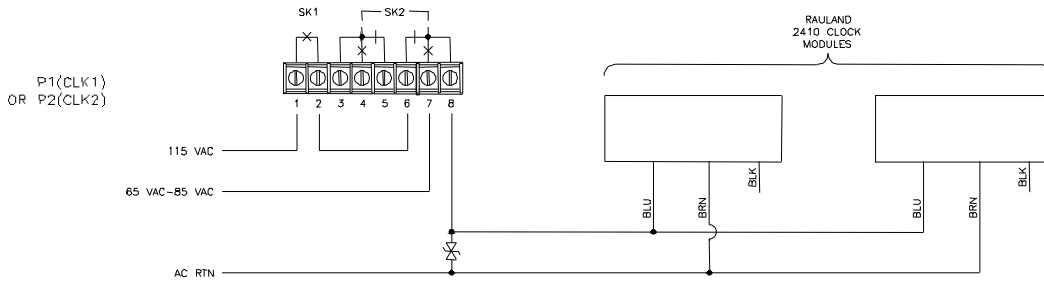
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

24VAC TYPE
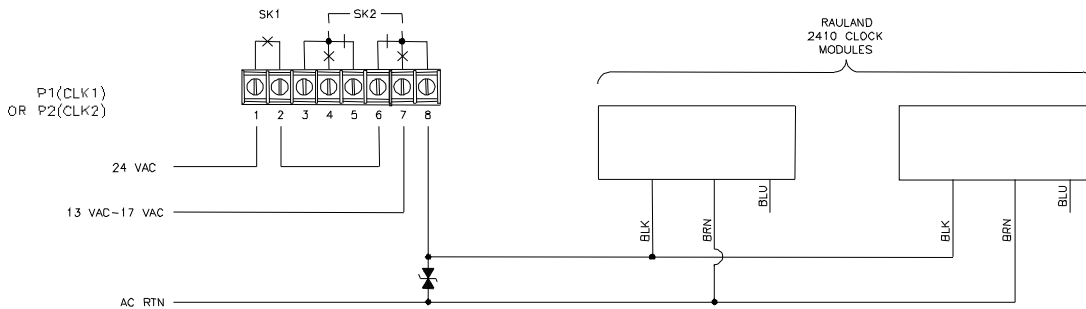
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 09 -   SIMPLEX 59TH MINUTE DUAL MOTOR

TYPE 10 -   SIMPLEX 45TH MINUTE DUAL MOTOR

TYPE 27 -   SIMPLEX 2310 DUAL MOTOR
Same hourly corrections as Type 09, but with addition of 12-hour corrections, as for Type 03.
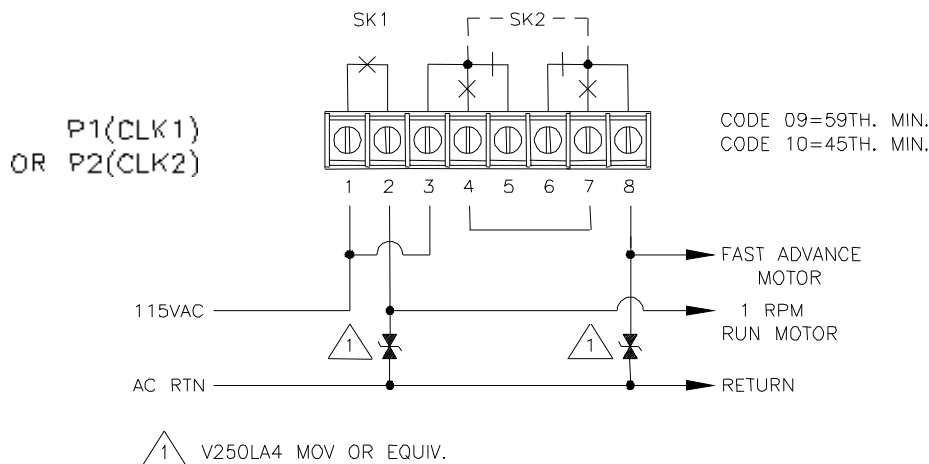
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

30

TYPE 11 - EDWARDS DUAL MOTOR

CODE 09=59TH. MIN.
CODE 10=45TH. MIN.

1 V250LA4 MOV OR EQUIV.
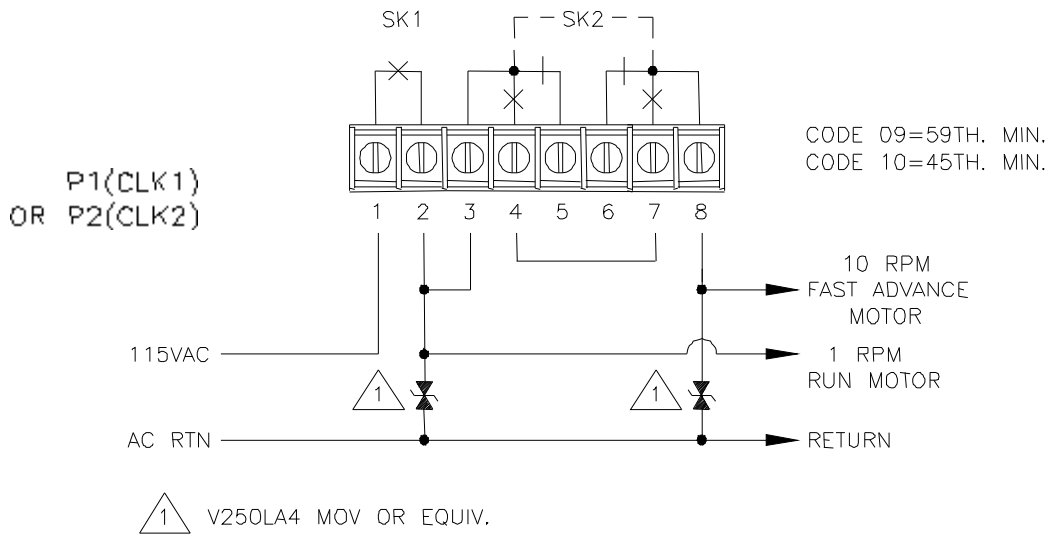
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 12 - CINCINNATI 'D6' CLOCKS
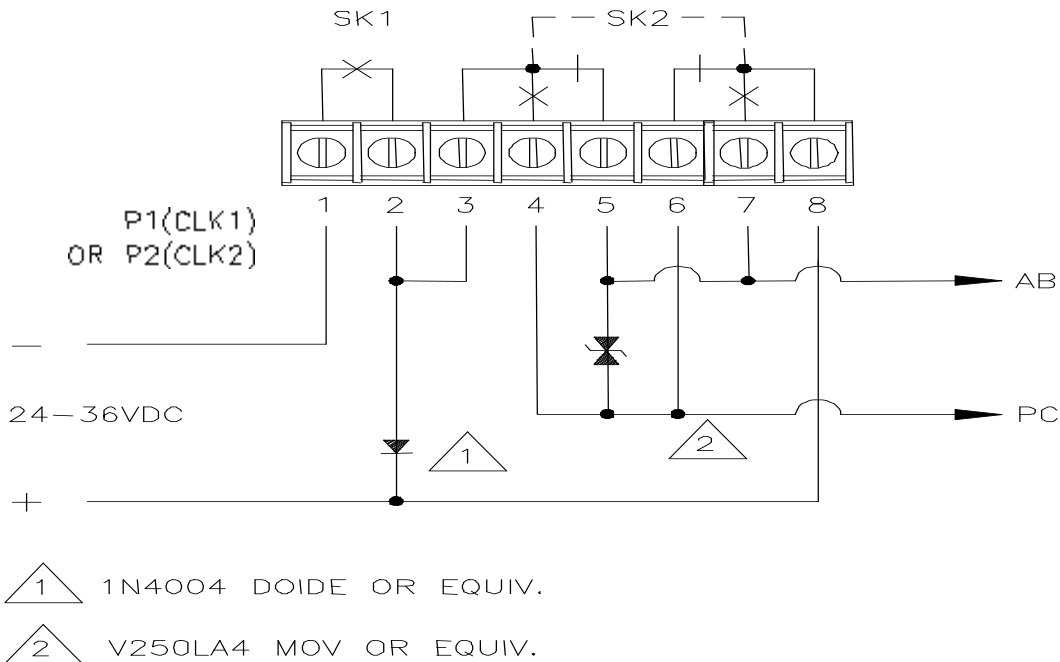
1 1N4004 DOIDE OR EQUIV.

2 V250LA4 MOV OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

31

TYPE 14 - ELECTRONIC CODED CLOCKS

Clocks run normally with 120 VAC power. For any bells or clock correction, the generator prestart relay (SK1) first turns on for the signal-generator to reach frequency. SK1 turns on at the 00 second after a programmed time or manual bell time. Then relay SK2 turns on for 3 seconds, from the 10th to the 13th second, to apply the generator signal (coded cup start signal) onto the 120 VAC. Bell circuits then turn on for 3 seconds, in the order listed below, applying the generator signal onto the 120 VAC for decoding by the coded cups. The bell relay contacts must connect in parallel with the normally open contacts of relay SK2. If it is not time for a clock correction signal, then SK1 turns off at the 59th second. At the 57th minute of each hour, SK2 turns on from 57:54 to 58:02, applying the 8-second hourly correction generator signal onto the 120 VAC. At 5:57 AM and 5:57 PM (12-hr correction), SK2 turns on from 5:57:54 to 5:57:08, applying a 14-second 12-hour correction generator signal onto the 120 VAC. For daylight savings, the clocks advance to the proper time by normal 12-hour correction, not at 2:00 AM. The order of each relay operation is listed below (**see NOTE for Type 15 re: SK1**):

| RELAY	FROM	TO	FROM	TO
SK1 Gen. Prestart (hourly corr.)	H:57:00			H:59:00
SK2 Start Signal (hourly corr.)	H:57:10	H:57:13	H:57:54	H:58:02
SK1 Gen. Prestart (12-hour corr.)	H:57:00			H:59:00
SK2 Start Signal (12 hour corr.)	5:57:10	5:57:13	5:57:54	5:58:08
SK1 Gen. Prestart (bells)	H:MM:00	H:MM:59		
SK2 Start Signal (bells)	H:MM:10	H:MM:13		
Bell Circuit 6	H:MM:20	H:MM:23		
Bell Circuit 5	H:MM:25	H:MM:28		
Bell Circuit 4	H:MM:30	H:MM:33		
Bell Circuit 3	H:MM:35	H:MM:38		
Bell Circuit 2	H:MM:40	H:MM:43		
Bell Circuit 1	H:MM:45	H:MM:48		

Bells should not be scheduled for:
HH:58:SS
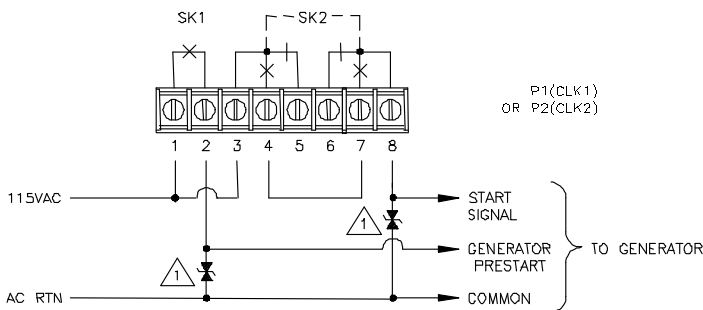
For Masters including firmware versions prior to V2.17 only:
NOTE: The LTRx-512 was designed for clocks that do not require a generator pre-start to set the frequency level. Clocks using this pre-start may not work with the LTRx-512 older than V2.17

1 V250LA4 MOV OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 15 -   STRAIGHT FREQUENCY

Clock correction and bell circuit operations are generated by sequentially applying various frequencies onto the 120 VAC. Each bell and clock correction circuit has its own frequency. Each bell and clock correction circuit has a receiver circuit that applies the associated bell or clock frequency (3510 Hz normally used for clock signals). For daylight savings, the clocks advance to the proper time by normal 12-hour correction, not at 2:00 AM. The time sequence of applying the frequencies to the 120 VAC is shown below, and the Master's bell and system relays control these frequencies:

RELAY		FROM	TO	
Bell Ckt. 1		H:MM:00	H:MM:05	Bells should not be scheduled for:
Bell Ckt. 2		H:MM:05	H:MM:10	HH:58:SS
Bell Ckt. 3		H:MM:10	H:MM:15	or
Bell Ckt. 4		H:MM:15	H:MM:20	00:00:SS
Bell Ckt. 5		H:MM:20	H:MM:25	
Bell Ckt. 6		H:MM:25	H:MM:30	
SK2	(Hourly Correction)	H:57:54	H:58:02	
	(12-Hour Correction)	5:57:54	5:58:08	
SK1	(Hourly Correction & 12-HourCorrection)	H:57:00	H:59:00	
	(Bells)	35 sec of min previous to Bell	30 sec of Bell time	

NOTE: Bells must be programmed 1 minute ahead of desired time.

Bells will not work during manual clock corrections and at the 58th minute.
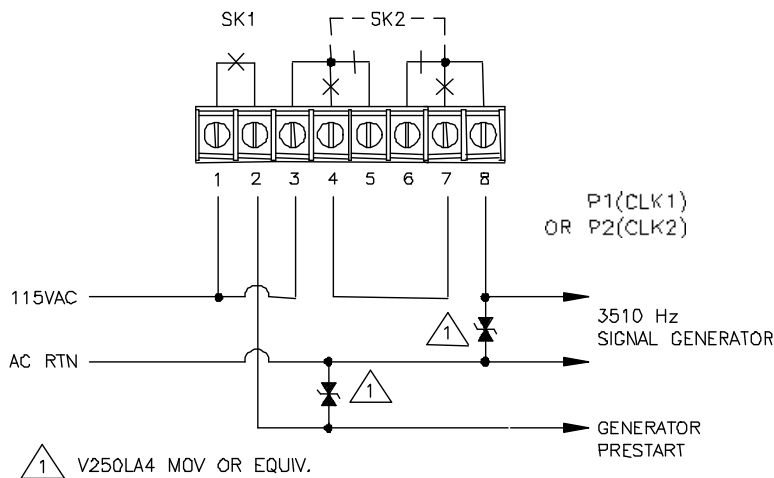
For Masters including firmware versions prior to V2.17 only:
NOTE: The LTRx-512 was designed to work with clocks that do not require a generator pre-start to set the frequency level. Clocks using this pre-start may not work with the LTRx-512 firmware older than V2.17.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 16 -   THREE WIRE MINUTE IMPULSE (59 MIN)
             WITH 12-HOUR CORRECTION

TYPES INCLUDE: Simplex   91 and 941
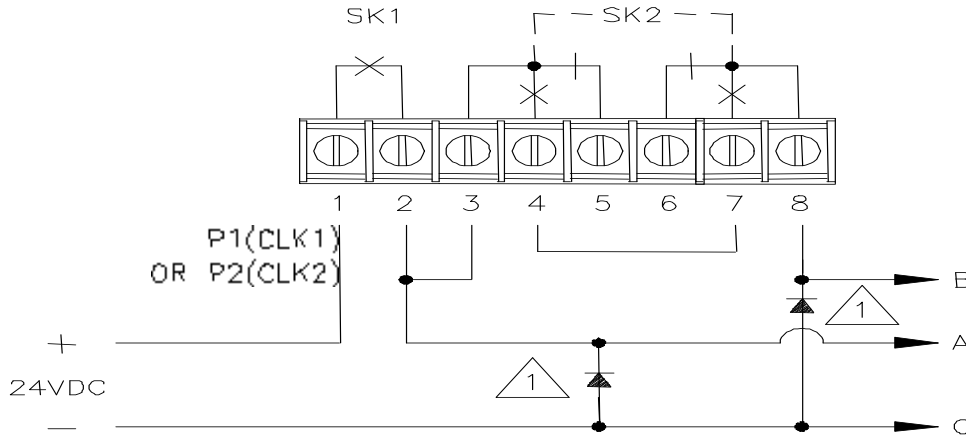
1   1N4004 DOIDE OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 16 -   TWO WIRE REVERSE POLARITY MINUTE IMPULSE (59 MIN)
             WITH 12-HOUR CORRECTION
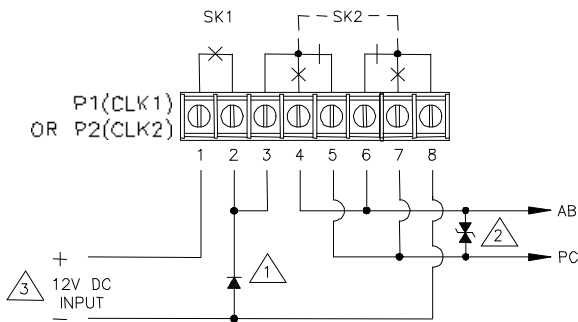
1 24 v' N4004 DOIDE OR EQUIV.

2   V250LA4 MOV OR EQUIV.
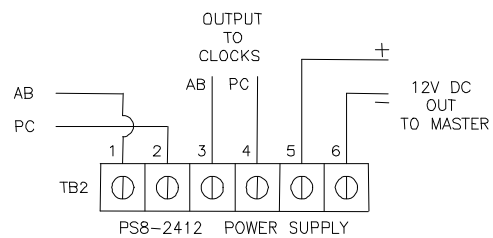
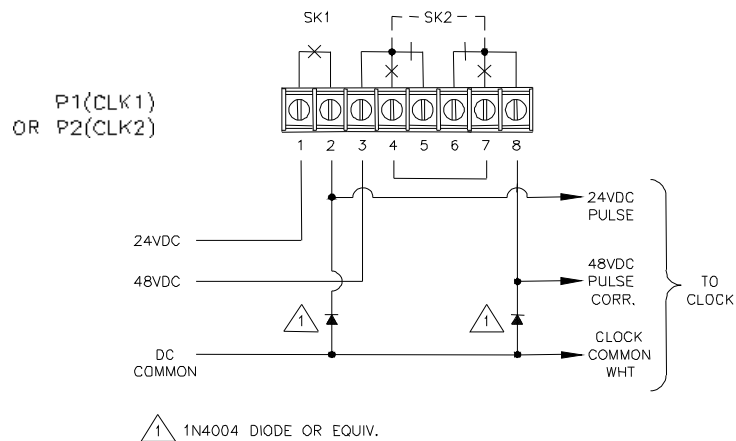3   FOR PROPER OPERATION, USE SPECIAL POWER SUPPLY LATHEM MODEL PS8-2412

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 17 -   STANDARD ELECTRIC TIME AR-2 TWO WIRE DUAL VOLTAGE
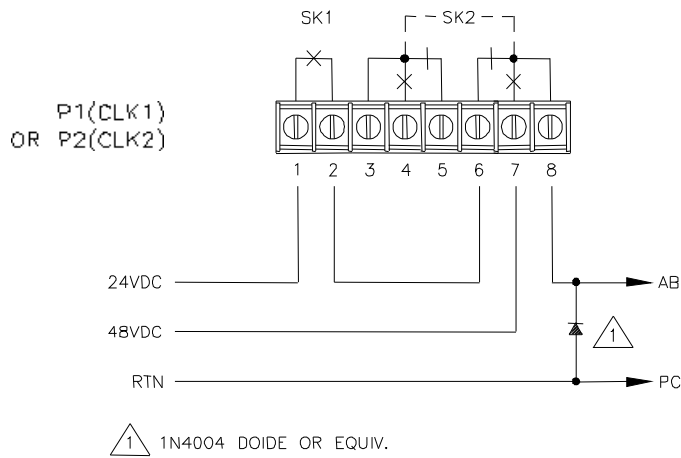
1N4004 DOIDE OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 17 -   STANDARD ELECTRIC TIME AR-3 THREE-WIRE IMPULSE

1N4004 DIODE OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

35

TYPE 18 -   NATIONAL SYNCHRONOUS WIRED

TYPES INCLUDE: Dukane   240 Series
                   Rauland   2463 Series
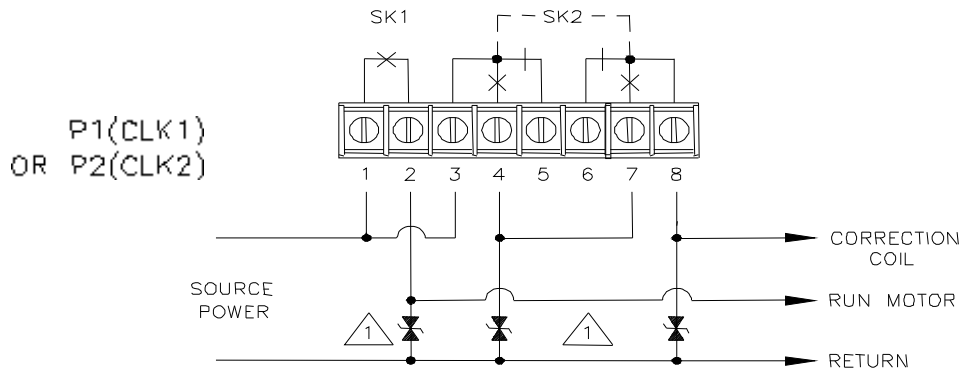
△1 V250LA4 MOV OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 19 -   STROMBERG SYNCHRONOUS WIRED

TYPES INCLUDE: Stromberg   Synchronous
                   Lathem   Type SS Wall Clocks (modified)

NOTE: Lathem type SS wall clocks can run according to the above signal operation if modified to reference the minute and second hands to HH:57:16 (versus HH:59:00) and the hour hand to 12 o'clock versus 6 o'clock.
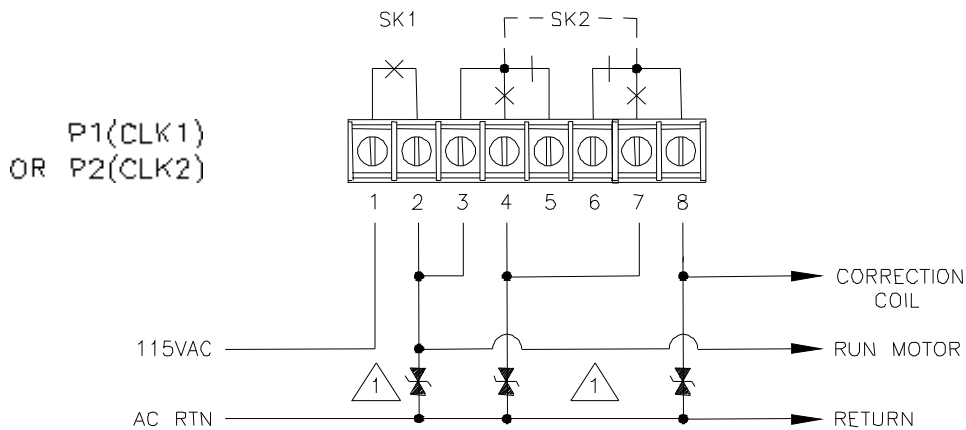
△1 V250LA4 MOV OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 20 -   THREE WIRE MINUTE IMPULSE (44TH MIN.)
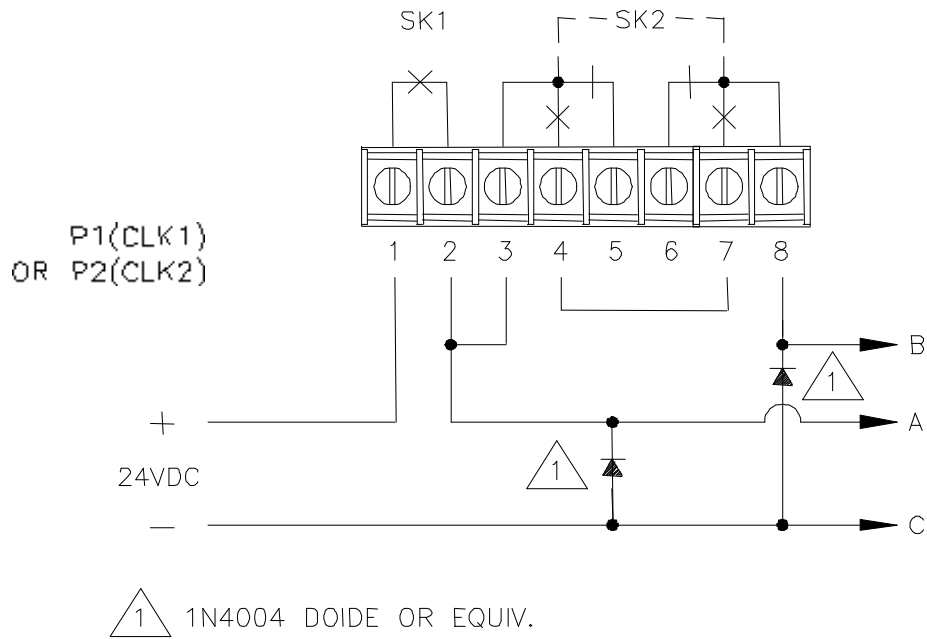
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 21 -   CINCINNATI 'D1'
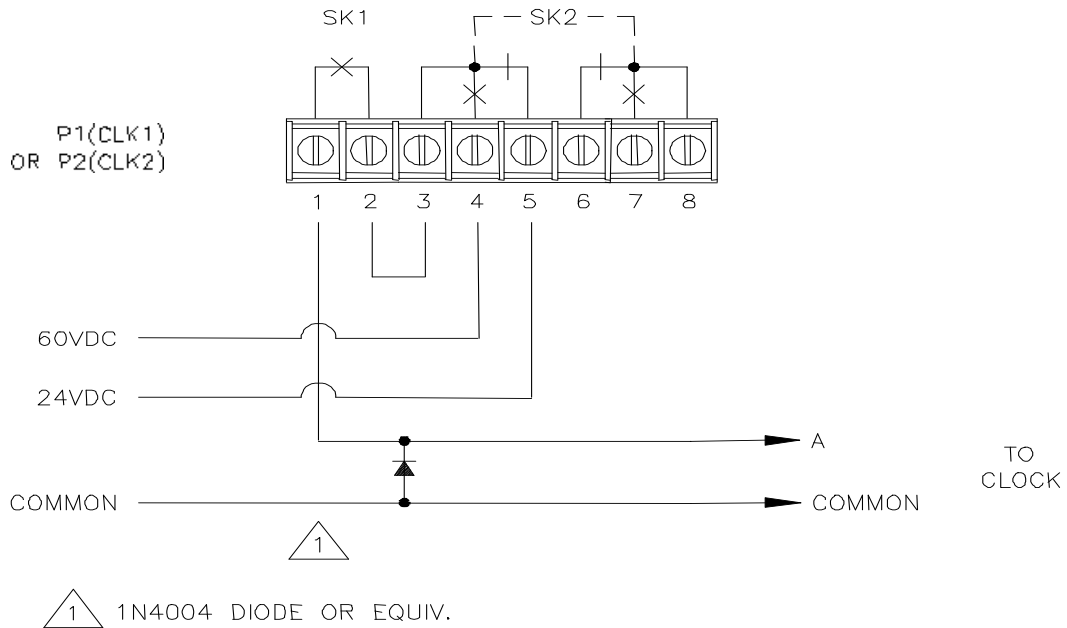
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 22 -   DUKANE SYNCHRONOUS WIRED
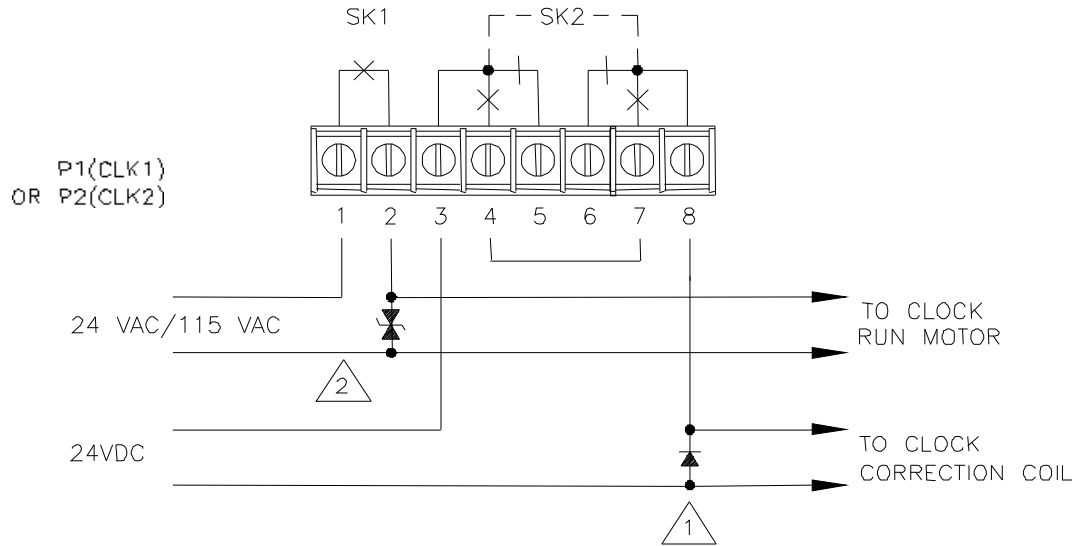
1 1N4004 DOIDE OR EQUIV.

2 V250LA4 MOV OR EQUIV.

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 23 -   CONDOR DIGITAL CLOCKS (Model 2412)

TYPES INCLUDE: Condor   2412

If the digital clocks lose sync with the LTRx-512, then you can use function [9]=SYNC CLOCKS to re-sync them.
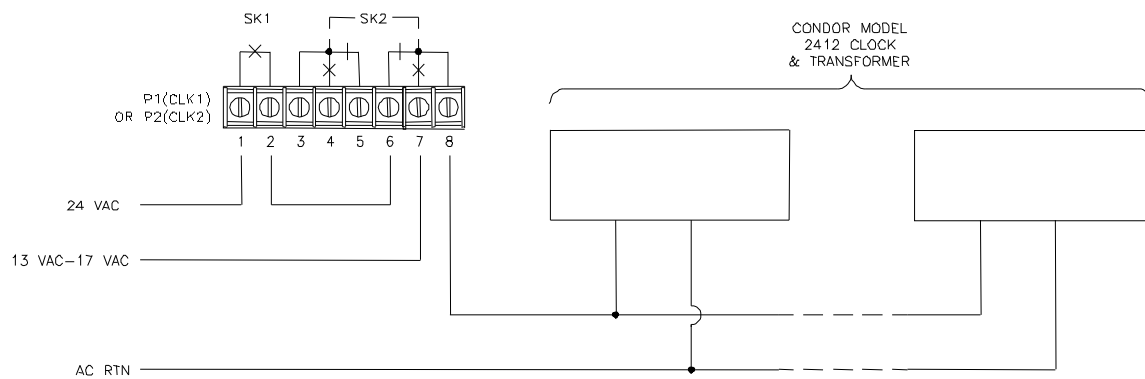
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 23 -   CONDOR DIGITAL CLOCKS (Model 2422)

TYPES INCLUDE: Rauland 2422

If the digital clocks lose sync with the LTRx-512, then you can use function [9]=SYNC CLOCKS to re-sync them.

NEW RAULAND MODEL 2422 WITH TIMER CONTROL FEATURE
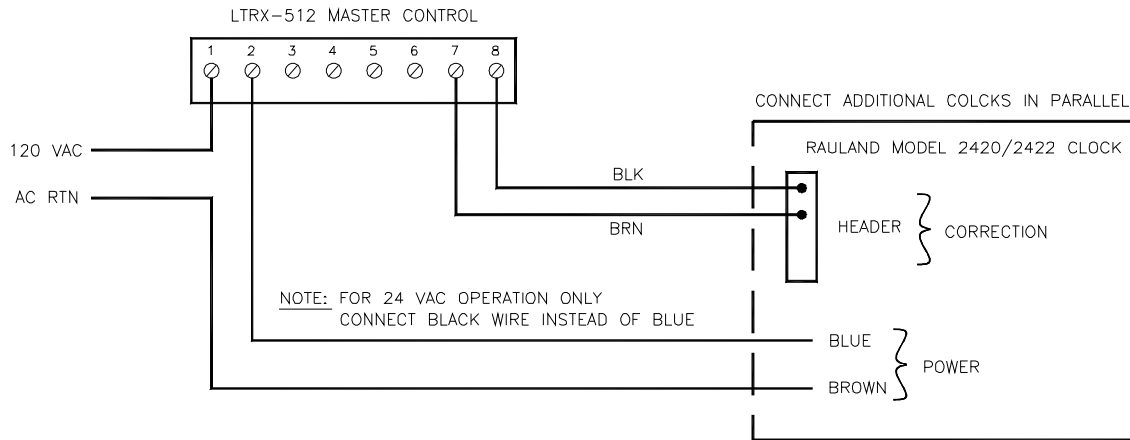
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 23 - CONDOR DIGITAL CLOCKS (BAR-AC-4412)

If the digital clocks lose sync with the LTRx-512, then you can use function [9]=SYNC CLOCKS to re-sync them.

CONDOR/DIGITAL DISPLAY SYSTEM
Model # BAR-AC-4412

All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 24 - EDWARDS SYNCHRONOUS WIRED CLOCKS - TYPE E1

SK1

SK2

P1(CLK1)
OR P2(CLK2)

TB2

1 2 3 4 5 6 7 8

WHT — COMMON

115 VAC

BLK — RUN MOTOR

AC RTN

RED △1 — CORRECTION

DIODE BRIDGE
200V MIN, PIV
AVG. CURRENT=NO. CLKS.
X 0.115A

△1 V250LA4 MOV OR EQUIV.
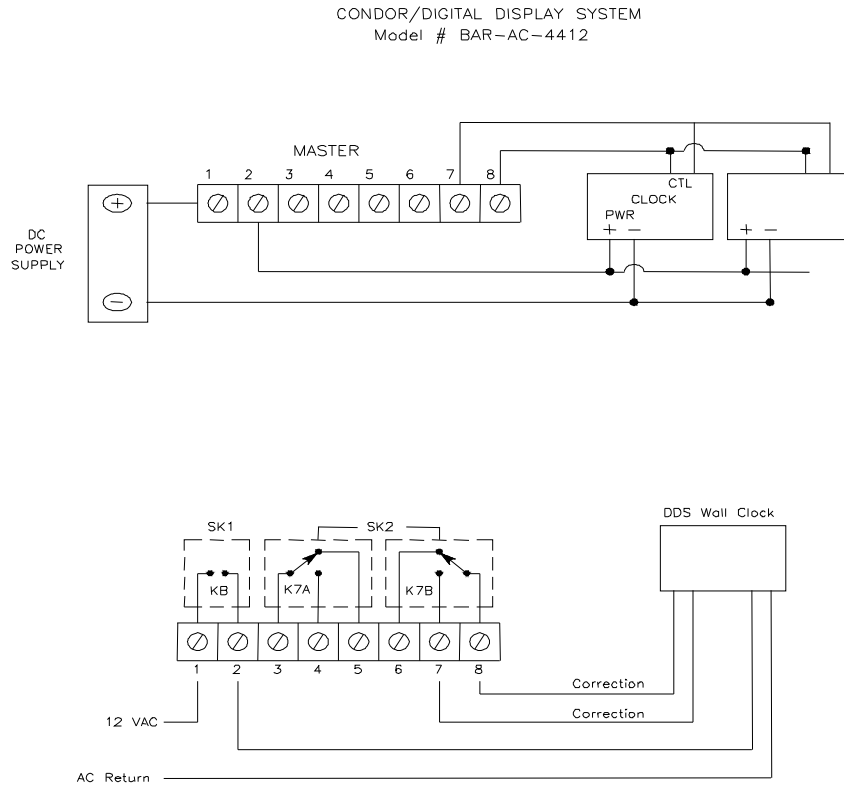
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

APPENDIX D - WIRING DIAGRAMS

Fig. D1 - TERMINAL BLOCK 'P4'

WIRING THE LTRx-512 FOR **120VAC** (nom.) OPERATION

120 VAC

WHT	GRN	BLK					
1	2	3	4	5	6	7	8

J1   J2
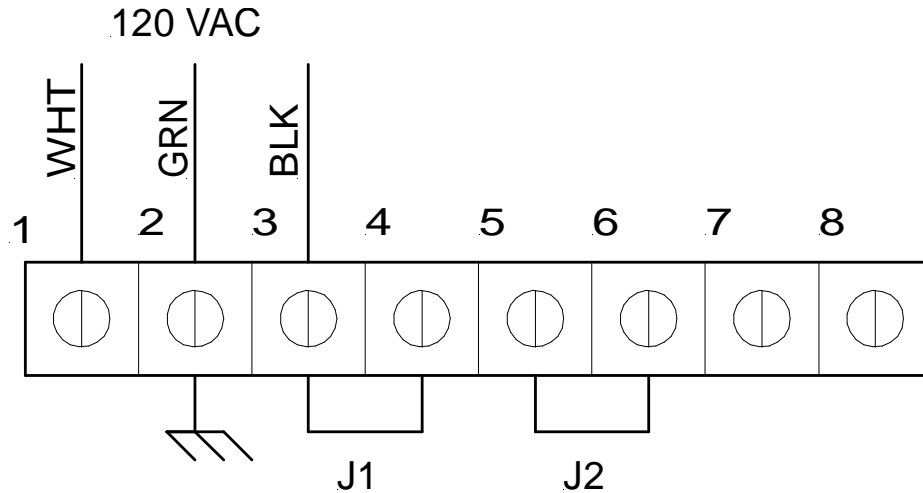
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

WIRING THE LTRx-512 FOR **220/240**VAC (nom.) OPERATION

220/240 VAC

WHT	GRN	BLK					
1	2	3	4	5	6	7	8

J1
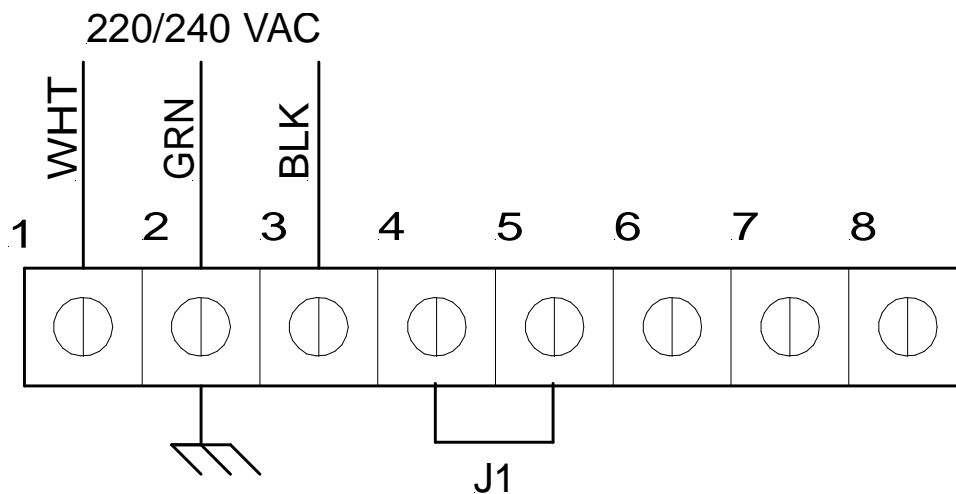
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

Fig. D2 - *TYPICAL* SIGNAL DEVICE WIRING

All circuits should be fused or protected by a circuit breaker (10Amp maximum)
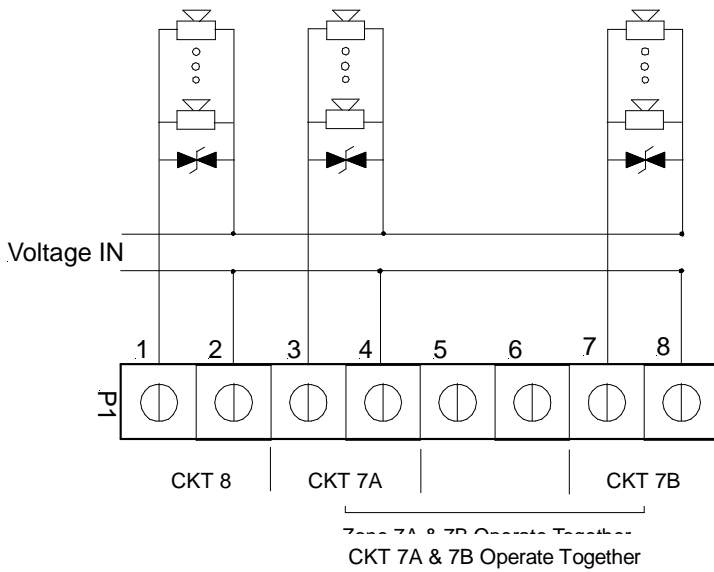
CKT 7A & 7B Operate Together. You may use either of these circuits for bells. In LTR4, these circuits become CKT 3 and CKT 4.

CKT 5A & 5B Operate Together. You may use either of these circuits for bells. In LTR4, these circuits become CKT 1 and CKT 2.
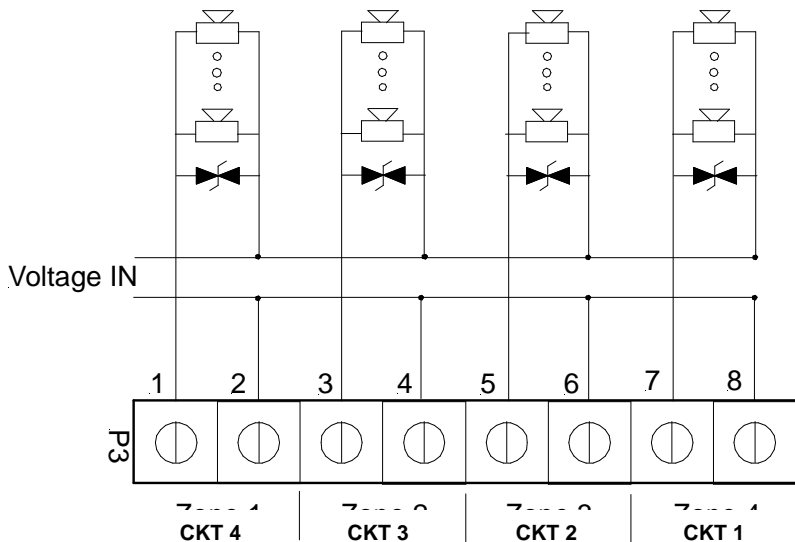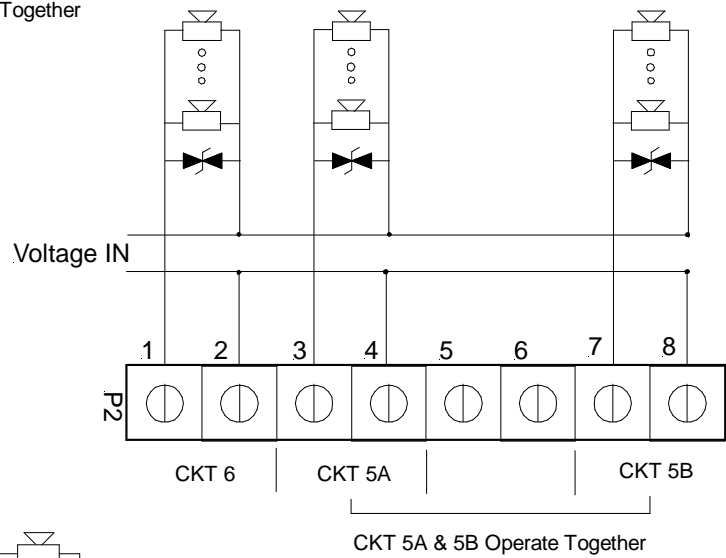
P3 is not included in the LTR4-512. Use CKT 5, 6, 7, & 8 for Bell Circuits.

Fig. D3 - COMPUTER CABLE
(For Front Access Port)
(LTR8-512 and LTR8-512M Only)
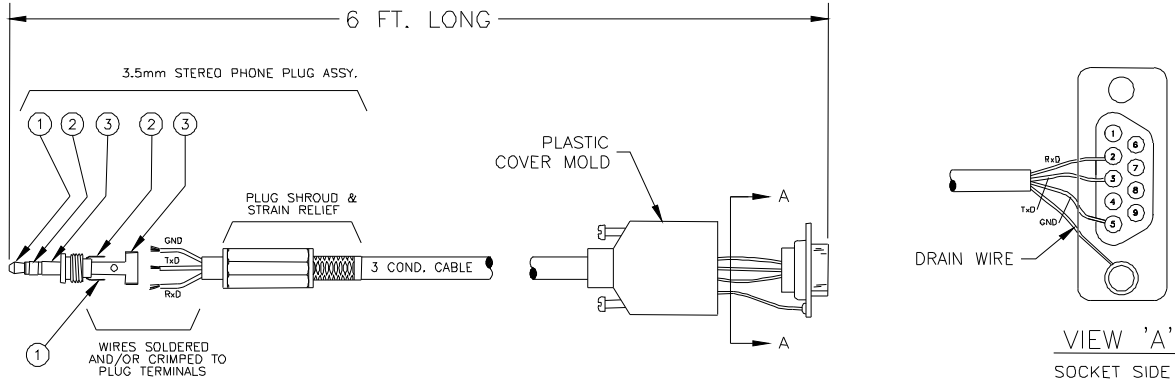
CABLE WIRING

PLUG IN	SIGNAL	DB9S CONTACT
1	RxDATA	2
2	GND	5
3	TxDATA	3
	SHIELD DRAIN WIRE	METAL SHELL

Fig. D4 - RS-232 CABLE
(for permanent connection to the
Communications Terminal Block)
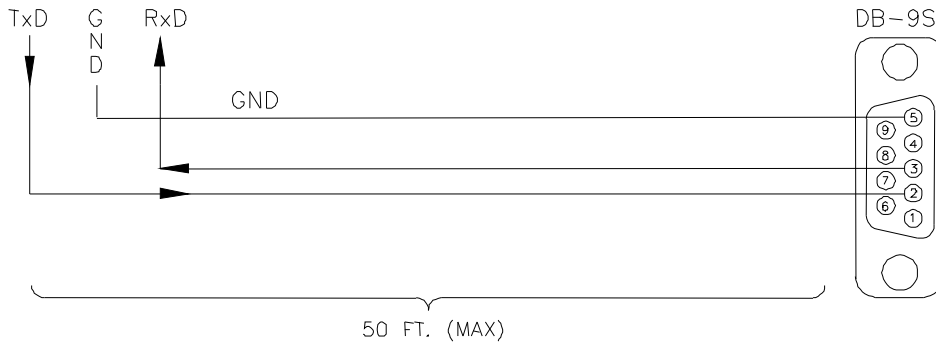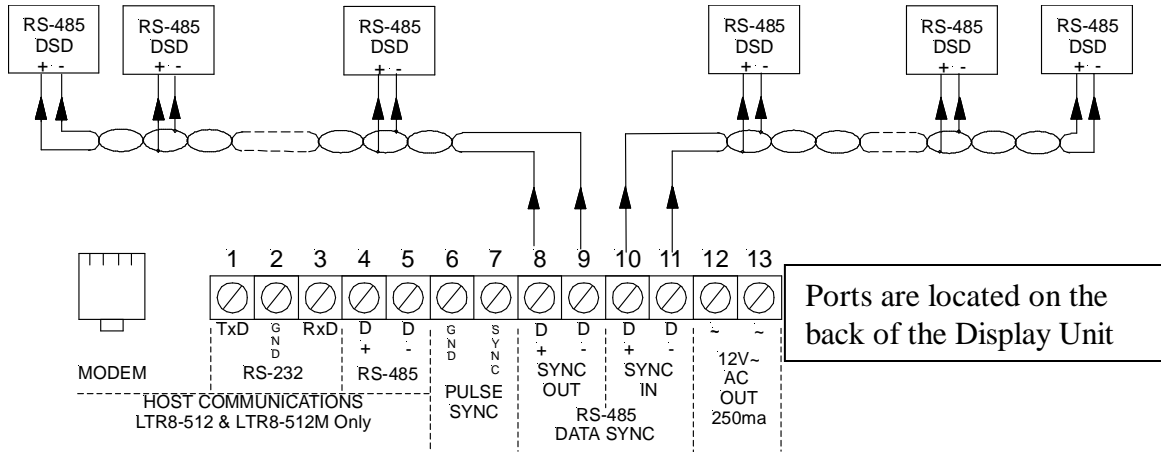**(LTR8-512 and LTR8-512M Only)**

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Fig. D5 - SYNCHING UP TO 60 RS-485 TIME SYNC DEVICES WITHOUT A BUFFER


Notes: Up to 30 RS-485 Data Sync Devices (DSDs) can be connected to the Data Sync port. Since the SYNC IN port can send as well as receive, 30 extra devices can be connected. If more than 60 DSDs are to be connected, another Master Clock will have to be used as a "Booster".

Fig. D6 - LTRx-512 USED AS SLAVE TO ALLOW 30 EXTRA RS-485 TIME SYNC DEVICES
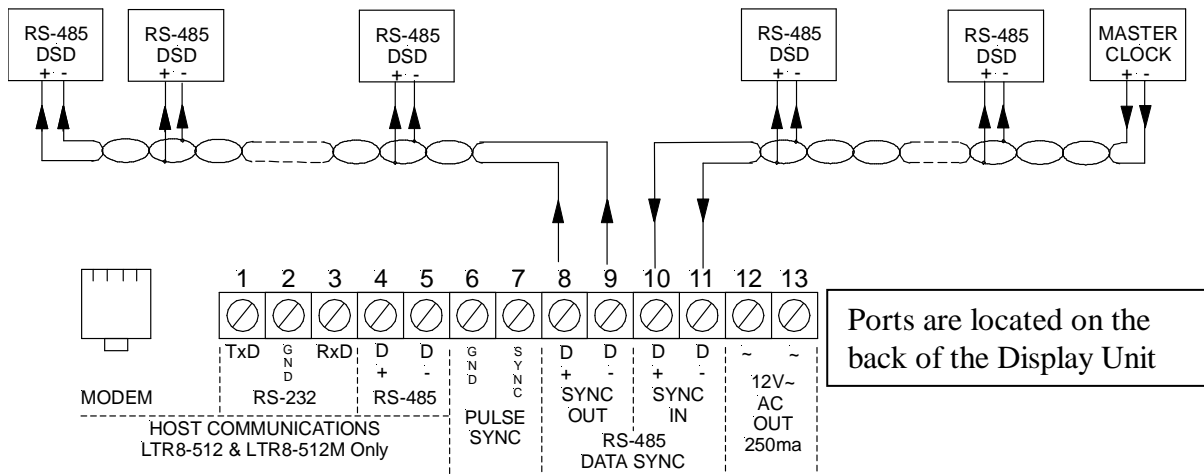
Note: Since the Sync In port can send as well as receive, 30 extra devices can connect here. If you already have a Master Source, such as an LTR-0, connect it and its string of clocks to the Sync In port, for a total of up to 60 devices.

45

Fig. D7 – COMMUNICATION TERMINAL BLOCK
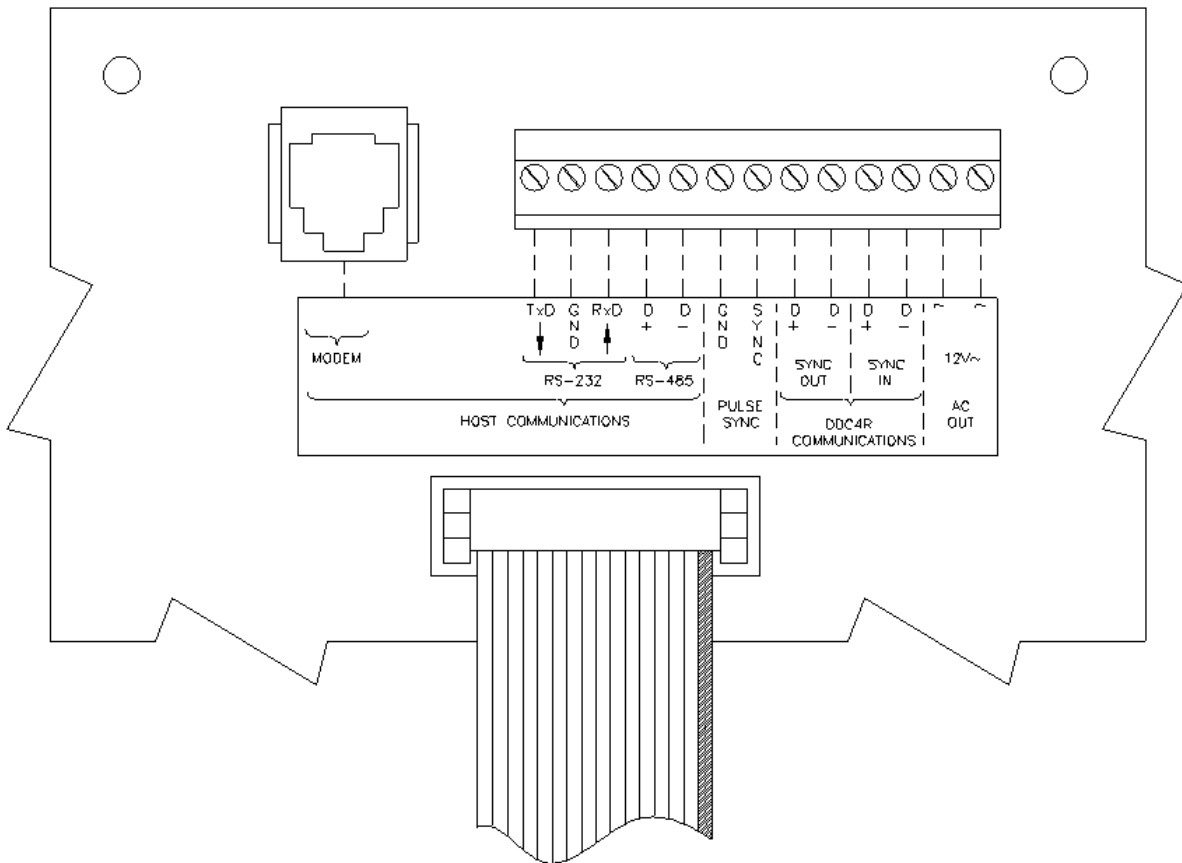

```
Rear of Display Unit
```

NOTES:
1. Twisted-pair (Cat-3/Cat-5) wire connects directly to Terminal Block; up to 2 wires per position
2. Pulse-sync input is same as provided in power supply. One (1) second (min.) dry-contact switch closure across terminals causes Master to reset time to 12:00AM of nearest date
3. Grounds (GND) are "signal grounds", **not** "chassis grounds"
4. Load on non-regulated 12VAC output **must** be less than 250mA
5. For DDC4R communications, the LTRx-512 automatically sets itself as a master or slave

<u>Strain Relief for the Communications Cable</u>

- Using the two wire tie wraps included in the installation kit, attach them to the terminal block as shown in this sample to provide strain relief to the communications cable. Use any two empty positions.
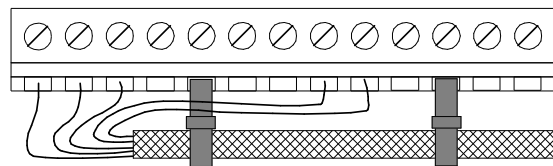
Use the six (6) connections as follows:

RS-485 Sync Time Device Connection

- Sync In: Terminal block pair used to receive RS-485 synchronization from another Lathem Master product or radio sync device, or transmit the LTRx-512's own sync commands to up to 31 RS-485 devices, including Lathem Masters and DDC4R Wall Clocks

- Sync Out: Terminal block pair used to buffer and repeat a received RS-485 sync signal, or transmit the LTRx-512's own synchronization commands to up to an additional 31 RS-485 devices

  Note: When first powered on, the LTRx-512 will "listen" to the Sync-In line to determine if it should be a "Master" or a "Slave". If it does not receive a time update for 15 minutes, it will assume it is a "Master" and start transmitting the time signal on the RS485 Synchronization line, every minute. It will re-evaluate it's Master/Slave status every day at 00:00 Hours. When setting up the Master/Slave system, make sure that you power on the "Master" first and connect the other LTRx-512 to the Sync-Out port on that clock.

Host Communications

- RS-232: Three terminal block contacts for RS-232 communications with an IBM-compatible computer running LTR MasterLink software for easy system setup

- RS-485: Terminal block pair for RS-485 communications with an IBM-compatible computer running LTR MasterLink software and SWIFT (RS485-RS232 converter)

- Modem: Modular connector for modem use. You can use the optional internal modem to dial out to the "Atomic Clock" at Ft. Collins, CO, or for a remote site using the LTR MasterLink and Terminal Manager software

12 Volt AC Out

- A non-regulated 12 Volt 250ma power source. Used with the LTR-RSS Remote Schedule Selector when in close proximaty to the Master Clock. **This circuit is not fused seperately and attaching devices with a higher current load may damage the Master Clock.**

Mounting the Master with Hidden Power Supply

- Using the optional eight (8) foot Connection Cable, you can mount the Display Unit semi-flush on the wall and place the Power Supply Box in the ceiling, floor or behind a wall. When attaching this cable, remove the standard short cable and connect the 8 foot cable to the power supply board with the cable moving away from the circuit board. Connect the other end to the back of the Display Unit using the ribbon cable connector. The cable should lead towards the bottom of the Display Unit. Attach the strain releif cable clamps at each end.

Fig. D8 - POWER SUPPLY TERMINAL BLOCKS
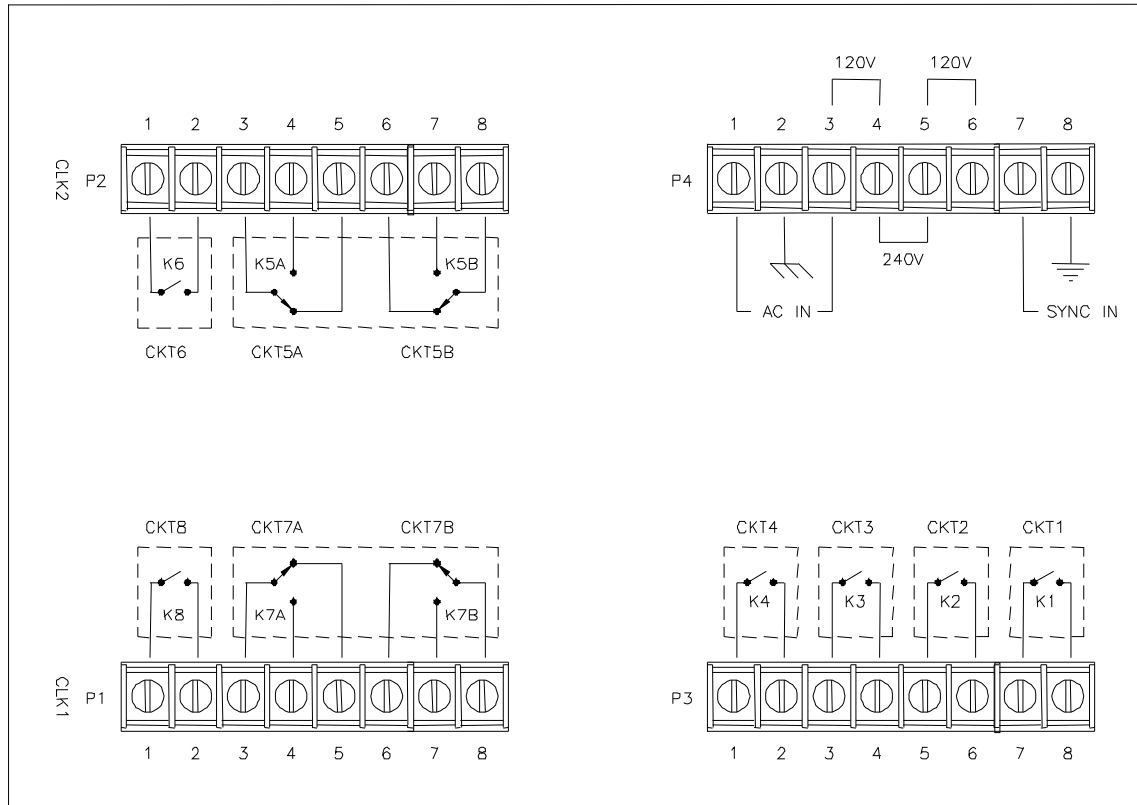
NOTES:

1. Circuits CKT1...CKT4 designate bell controls. Circuit pairs CKT5/CKT6 and CKT7/CKT8 can function as clock synchronization circuits or as bell controls
(*Note: CKT1...CKT4 do not exist on the LTR4-512. Instead use CKT5...CKT8 which are indicated related to the LEDs on the Display Unit numbered 1-4*).

2. MOV's (Metal-Oxide Varistors) protect all relay contacts

3. Voltage-select jumpers connect to terminal block P4 for 120VAC operation. Users who need to run at 220/240VAC **must** remove the 120V jumpers and install **one** jumper wire for the 240V selection. The system will automatically adjust for operation at 60Hz or 50Hz at either voltage

4. Some clock setups may require external diodes or MOV's. See the wiring diagram for your type clock

APPENDIX E – INSTALL THE OPTIONAL MODEM

Installation of the optional internal modem should be performed by a trained and competent electronics technician. Follow these steps;

1. Turn off the power to the Master Clock. You can either access the on/off switch inside the Power Supply Box or turn off the power at the source.

2. Remove the four (4) screws from the sides of the Display Unit.

3. Gently remove the cover of the Display Unit. **Some adhesive me hold the cover to the display and keypad.** A gentle pull should have the cover pull free.

4. Locate the large rectangular hole in the circuit board just to the right of the display.

5. Carefully insert the modem into the sockets on each side of the opening. The modem goes in with the transformer on the modem board at the top of the board.

6. Replace the cover and secure it with the four (4) screws.

7. Connect a working ANALOG telephone line to the telephone jack on the back of the display unit.

8. Replace the Master Clock to its original position and restore power.

9. Setup the Communications on the Master Clock. Press [#][9][0][0][#] and ensure that the baud rate is at 9600 and verify the ID# of this Master Clock.

10. Setup your LTR MasterLink software to communicate with a modem clock and test the connection.

MODEM
Installed
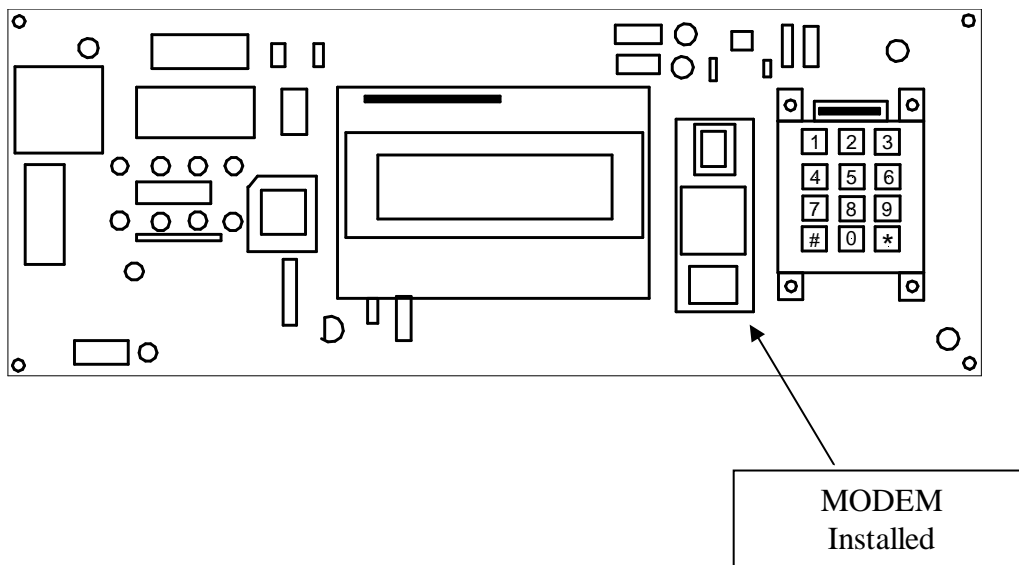
APPENDIX F – Connecting the LTR-RSS Remote Schedule Selector

The "Remote Schedule Selector" is an accessory for the LTR8-512 Master Controller and allows an Operator to select one (1) of the eight (8) possible schedules stored in the Master Controller [or No Schedule] for immediate activation. The selection made will remain in effect until either an alternate selection is made (at the Master's KeyPad, via MasterLink Software or through the Remote Schedule Selector) or a Programmed Schedule Change occurs.

The Assembly of the Remote Schedule Selector consists of an Electronic Circuit suspended beneath a cover plate for a double-gang switch-type electrical box (not supplied with the product). The Circuit includes a low-power MicroProcessor, a method of selecting the 'Address' of the Master to be remotely controlled, and a 4-screw Terminal Block for Installer Interconnect. Two screws of the Terminal Block are for attachment of the Twisted-Pair (Cat-3 typical) low-voltage Network Communications Cable to the Master's RS-485 Port. The other two screws are to be used for supplying 9-24V AC/DC as continuous power source to the unit.

On the face of the the cover plate are a 10-position Rotary Switch (to select the Schedule to be made 'Active'), a Push Button to send the Command to the Master, and an array of lighting Status Indicators by which the Operator can receive confirmation from the Master that the Change Schedule Command has been accepted and acted upon.

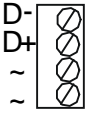MASTER CONTROL REMOTE SCHEDULE
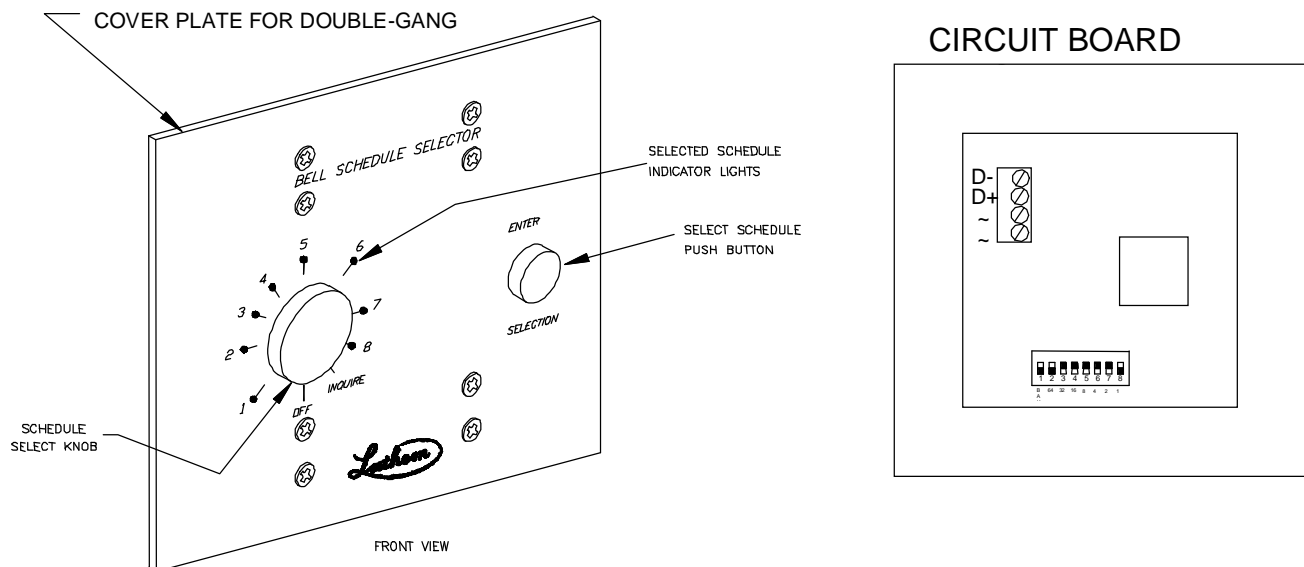
INSTALLATION

To install the Remote Schedule Selector,

- Remove the RSS from it's package and locate the four (4) conductor connector (upper left) and the dip switch (bottom center) on the back of the circuit board.

- Set the hidden Address Selector dip switch to match the Master's Programmed Address (default = Code 65) and the Master Clock's baud rate. You accomplish this by sliding the dip switches towards the legend on the circuit board.
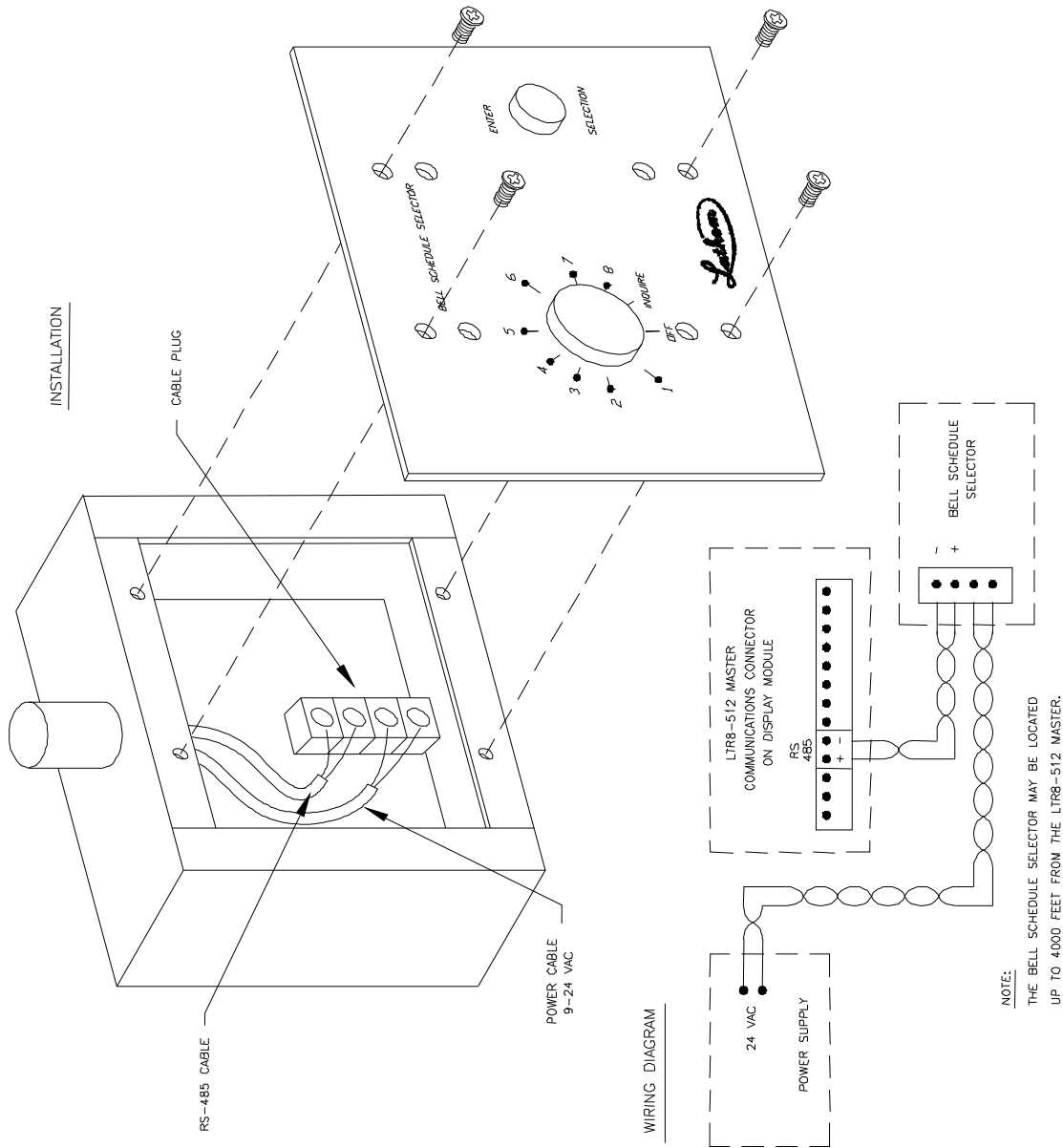
    The Baud Rate is selected with switch 1. Slide it towards the bottom of the board to select 9600 baud (default) and up to select 2400 baud.

    To select the address, total up the numbers below the switches to arrive at the total which equals the addess you wish and slide those switches down. For example, the default address is 065. Switch 2 (value of 64) and switch 8 (value of 1) are down. (64+1 = 65) For address 003, you would slide switch 7 and switch 8 down (2+1=3). For address 102, you would slide down switches 2, 3, 6 and 7. (64+32+4+2=102)
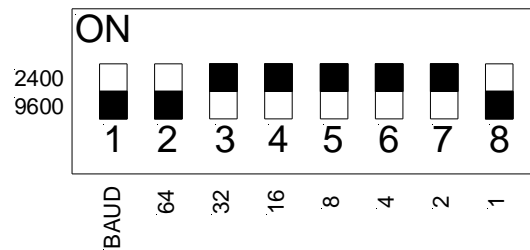
- Attach the Communication Cable wire-pair (with proper polarity). The upper contector is Data - and the next one down is Data + .

- Connect a low-voltage Power to the lower 2 terminals on the Terminal Block. The LTR-RSS requires a voltage source of between 9 and 24 Volts, AC or DC. *Note: It is recommended that you use a power supply other than the power supplied from terminals 12 and 13 of the Communications Terminals on the back of the Master Clock's Display Unit. This provides 12 Volts AC at 250ma. Wire runs of greater than 100 feet or placed in areas that may cause electrical interferances will cause problems.We also recommend that you place an in-line 250ma fuse on this connection.*

- Secure the cover-plate to the electrical box with four 6-32 FH screws.

INSTALLATION DETAIL

INSTALLATION

CABLE PLUG

POWER CABLE
9-24 VAC

RS-485 CABLE

LTR8-512 MASTER
COMMUNICATIONS CONNECTOR
ON DISPLAY MODULE

RS
485

BELL SCHEDULE
SELECTOR

POWER SUPPLY

24 VAC

NOTE:
THE BELL SCHEDULE SELECTOR MAY BE LOCATED
UP TO 4000 FEET FROM THE LTR8-512 MASTER.

WIRING DIAGRAM

BELL SCHEDULE SELECTOR

ENTER   SELECTION

OFF   INQUIRE
8
7
6
5
4
3
2
1

OPERATIONAL DESCRIPTION

To use the Remote Schedule Selector, the Operator will first select, via the Rotary Switch, which of the Schedules is to be made active.

> The 'OFF' position may be used to de-activate all schedules

> Positions '1' to '8' may be used to select a single Schedule to be made 'Active'

> The 'INQUIRE' position may be used to determine which Schedules may be currently 'Active' without altering those schedules previously selected.

After setting the selected position of the Rotary Switch, the Operator should press the 'ENTER SELECTION' Push-Button. This will transmit the appropriate Command to the Master. It will wait for a reply from the Master, display which Schedule(s) are now Active on the Lighting Indicators (LEDs) as confirmation to the Operator that the Command has been accepted and executed by the Master. The lit Indicators will remain active for a period of five (5) seconds, after which the unit will go back to 'sleep mode', to conserve power.

# APPENDIX G – Connecting the LTR-GPS Satellite Receiver / Synchronizer

Lathem's LTR-GPS is a Global Positioning Satellite receiver using 12-channels to access the accurate date and time signal transmitted each second by 24 satellites in geosynchronous orbit around the globe. The package includes an amplified GPS Antenna, which must be mounted out-doors or beneath a roof sky-light, facing skyward. An integrated cable links the Antenna to the LTR-GPS Receiver Module, which should be mounted in-doors.

The Receiver Module verifies and reformats the received satellite data, and offers multiple synchronization protocol outputs, including a capability to synchronize LTRx-512 Master Clocks to this highly accurate "Atomic" reference.

Simple DIP-Switch set-up enables the installer to specify Local Time Zone, Daylight Savings Time corrections, and output formats. An LED indicator shows Signal Reception / Protocol Mode.

Unshielded Twisted-Pair (UTP) Cable (Cat-3 or Cat-5) is suitable to connect the D+/D- Data Output Terminals of the LTR-GPS to the D+/D- "Sync-In" Terminals on the back of the Master Clock's Front Panel Assembly.
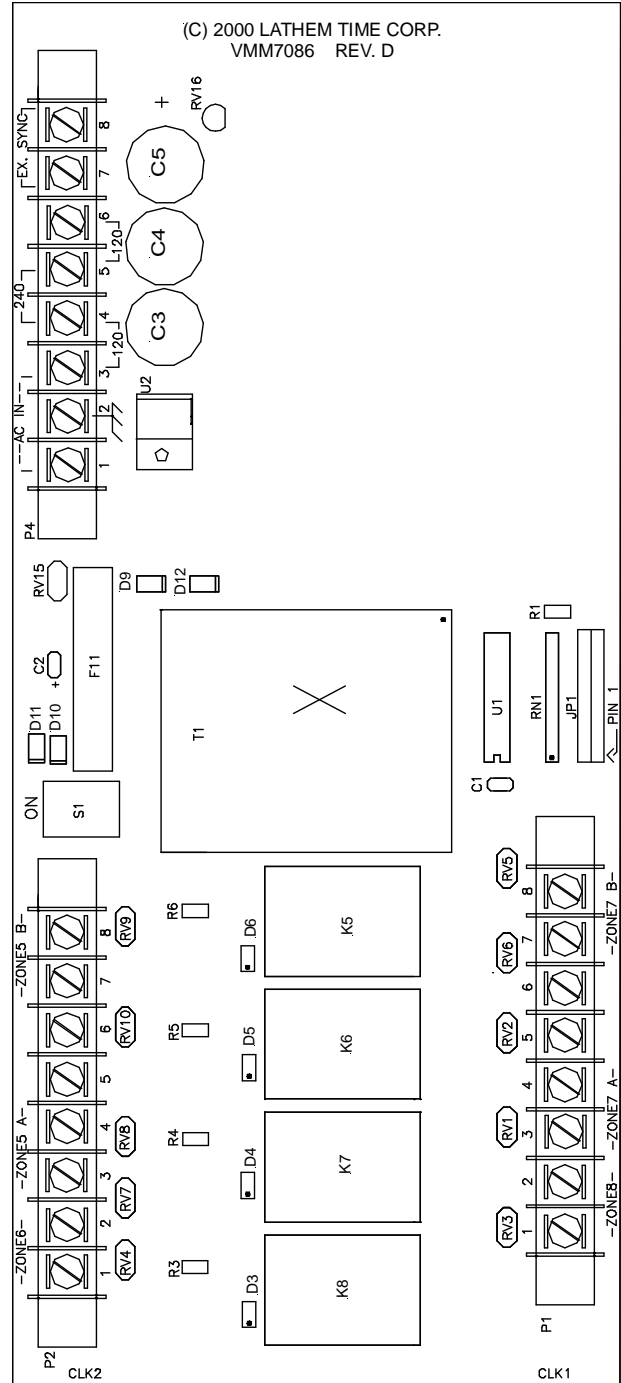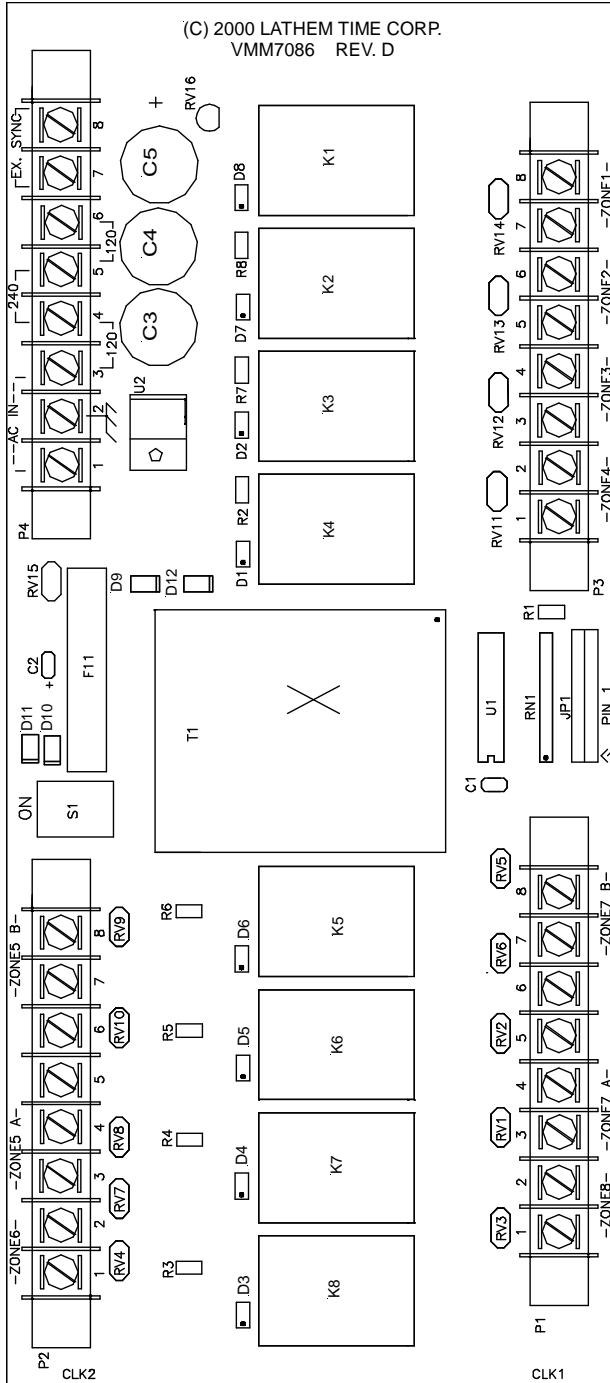
The LTR-GPS may receive its power from an LTRx-512-series Master Clock, using a 2nd cable pair (as illustrated below), if the distance is less than 200ft; else, power is provided locally by a 9vAC Power Adapter.
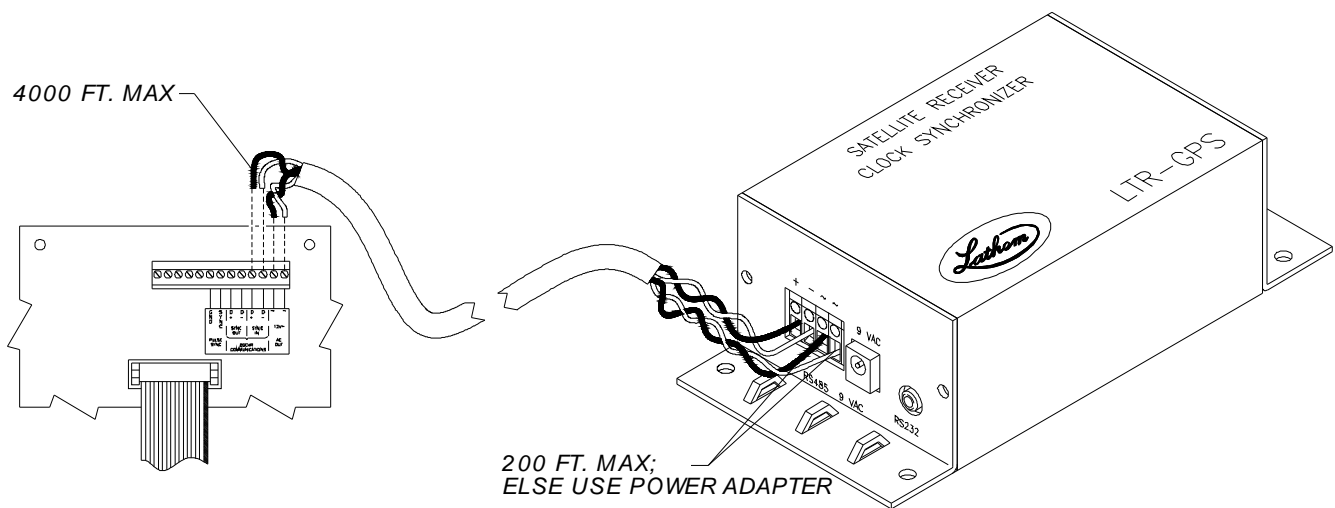
APPENDIX H – POWER SUPPLY SCHEMATICS

LTR8-512 / LTR8-512M

LTR4-512

FOR UNITS EQUIPPED WITH AN INTERNAL MODEM

NOTICE: This equipment complies with Part 68 of the FCC Rules. On the mounting panel of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, provide this information to your Telephone Company.

The registration jack USOC for this equipment is (RJ-11). An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to connect to the telephone network or premises wiring using a compatible modular jack, which is Part 68 compliant. See installation instructions for details.

The REN is useful to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of "REN" of all devices should not exceed five (5). To be certain of the number of devices that may be connected to a line, as determined by the total "REN", contact the local Telephone Company.

If your telephone equipment (Modem) causes harm to the telephone network, the Telephone Company will notify you in advance that temporary discontinuance of service may be required, but if advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC if you believe it is necessary.

Your Telephone Company may make changes in its facilities, equipment, operations or procedures that could affect the operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

If you experience trouble with this equipment (Modem), please contact Lathem Time Customer Service at (800) 241-4990 for repair/warranty information. If your equipment is causing harm to the telephone network, the Telephone Company may request that you disconnect the equipment until the problem is resolved.

A Lathem-Authorized Service Center will replace a defective Lathem Modem product.

This equipment may not be used on public coin service provided by the Telephone Company. Connection to party lines is subject to state tariffs. (Contact your state public utility commission or corporation commission for information.)

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local Telecommunications Company. This equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Any equipment repairs made by the user, or equipment malfunctions, may give the Telecommunications Company cause to request the user to disconnect the equipment.

Users should ensure, for their own protection, that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

A NOTE ABOUT THE LITHIUM BATTERY

This product's lithium battery contains Perchlorate Material - special handling may apply. Please go to web site www.dtsc.ca.gov/hazardouswaste/perchlorate for information about proper methods of disposal in California.

Limited One-Year Limited Warranty

Lathem warrants the hardware products described in this guide against defects in material and workmanship for a period of **one year** from date of original purchase from Lathem or from an authorized Lathem reseller. The conditions of this warranty and the extent of the responsibility of Lathem Time Corporation ("Lathem") under this warranty are listed below.

1. This warranty will become void when service performed by anyone other than an approved Lathem warranty service dealer results in damage to the product.
2. This warranty does not apply to any product which has been subject to abuse, neglect, or accident, or which has had the serial number altered or removed, or which has been connected, installed, adjusted, or repaired other than in accordance with instructions furnished by Lathem.
3. This warranty does not cover dealer labor cost for removing and reinstalling the machine for repair, or any expendable parts that are readily replaced due to normal use.
4. The sole responsibility of Lathem under this warranty shall be limited to repair of this product, or replacement thereof, at the sole discretion of Lathem.
5. If it becomes necessary to send the product or any defective part to Lathem or any authorized service dealer, the product must be shipped in its original carton or equivalent, fully insured with shipping charges prepaid. Lathem will not assume any responsibility for any loss or damage incurred in shipping.
6. WARRANTY DISCLAIMER AND LIMITATION OF LIABILITY: Except only the limited express warranty set forth above, the products are sold with no expressed or implied warranties of any kind, and the implied warranties of merchantability and fitness for a particular purpose are hereby expressly disclaimed. No warranties are given with respect to products purchased other than from Lathem or an authorized Lathem reseller and any such products are purchased "as is, with all faults." In no event will Lathem be liable for any direct, indirect, special, incidental or consequential damages arising out of or in connection with the delivery, use or inability to use, or performance of this product. In the event any limited remedy given herein shall be deemed to have failed of its essential purpose, Lathem's maximum liability shall be to refund the purchase price upon return of the product.
7. Proof of date of purchase from Lathem or an authorized Lathem reseller is required for warranty service on this product.
8. This Warranty grants specific legal rights. Additional legal rights, which may vary by locale, may also apply.
9. Should any difficulties arise with the performance of this product during warranty, or with any Lathem authorized service centers, contact Lathem Time at the address below.

Lathem Time
200 Selig Drive, SW, Atlanta, GA 30336
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