

LTR4-512
LTR8-512
LTR8-512M
Master Clock



Installation & User's Guide



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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.

**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 numérique de la classe B est conforme à la norme NMB-003 du Canada.**

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Welcome

Thank you for purchasing your new MASTER CLOCK. You can use your new Master to ring bells or turn on circuits for up to 99 seconds, as well as to synchronize the time on secondary wall clocks or devices. This manual covers 3 models of MASTER clocks: the LTR4-512, the LTR8-512 and the LTR8-512M

	LTR4-512	LTR8-512	LTR8-512M
System Clock Correction	1 correction type running, plus RS485 correction	Up to 2 like or dissimilar correction types running simultaneously, plus RS485 correction	Up to 2 like or dissimilar correction types running simultaneously, plus RS485 correction
Bell Circuits	4 with no clock correction 2 with 1 clock correction	8 with no clock correction 6 with 1 clock correction 4 with 2 clock correction	8 with no clock correction 6 with 1 clock correction 4 with 2 clock correction
Certifications	UL, cUL, FCC	UL, cUL, FCC, DOC (internal modem option)	UL, cUL, FCC, DOC (internal modem)
PC Interface Software	None	RS-232, RS-485, Ethernet (requires TXTOSER + Cable)	RS-232, RS-485, Modem , Ethernet (requires TXTOSER + Cable)
Atomic clock synchronization	Yes. Requires LTR-GPS	Yes. Requires LTR-GPS or MasterLink software	Yes. Requires LTR-GPS or MasterLink software

If your Master has 4 lights on the front panel, then you have the model LTR4-512



If your Master has 8 lights at the left of the front panel, then you have the model LTR8-512. If the TR light at the keypad is lit, then you have the model LTR8-512M

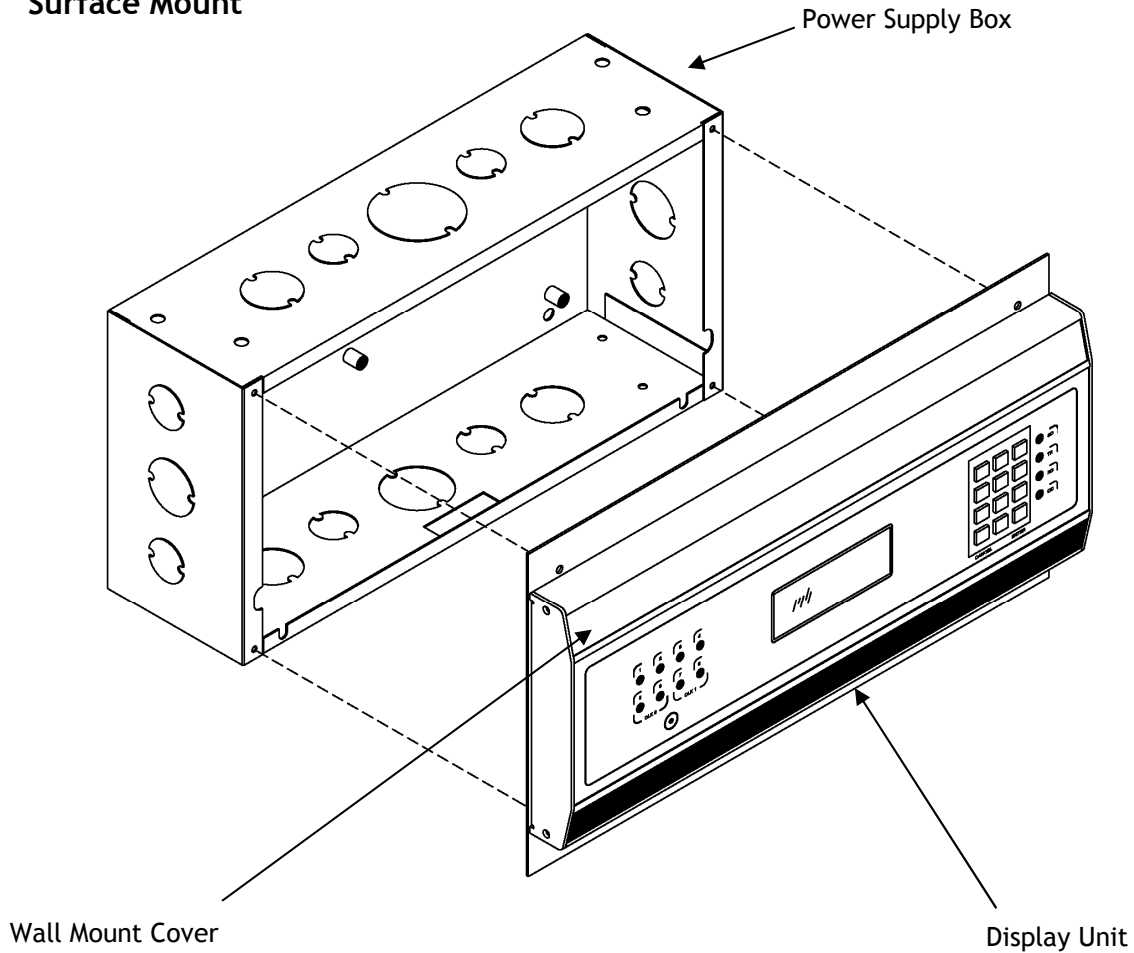


Step 1 - Mounting the Master

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



To surface mount the Master

1. Place the Master on its back with the display unit facing up and the keypad to the right
2. Remove the two screws from just above the display unit
3. 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
4. Unplug the ribbon power cable from the back of the display unit
5. Set the display unit aside
6. Place two wall anchors and #8 screws 10 inches apart and level on the wall where you want to mount the Master
7. If needed, place two wall anchors 5 inches below the first two screws
8. Hang the power supply onto the top two screws using the keyholes on the back
9. Screw two more #8 screws through the two holes at the bottom of the power supply into the wall anchors
10. Follow the wiring steps in step 2
11. Reconnect the ribbon cable
12. Replace the display unit using the two screws that you earlier removed

Semi-Flush Mount

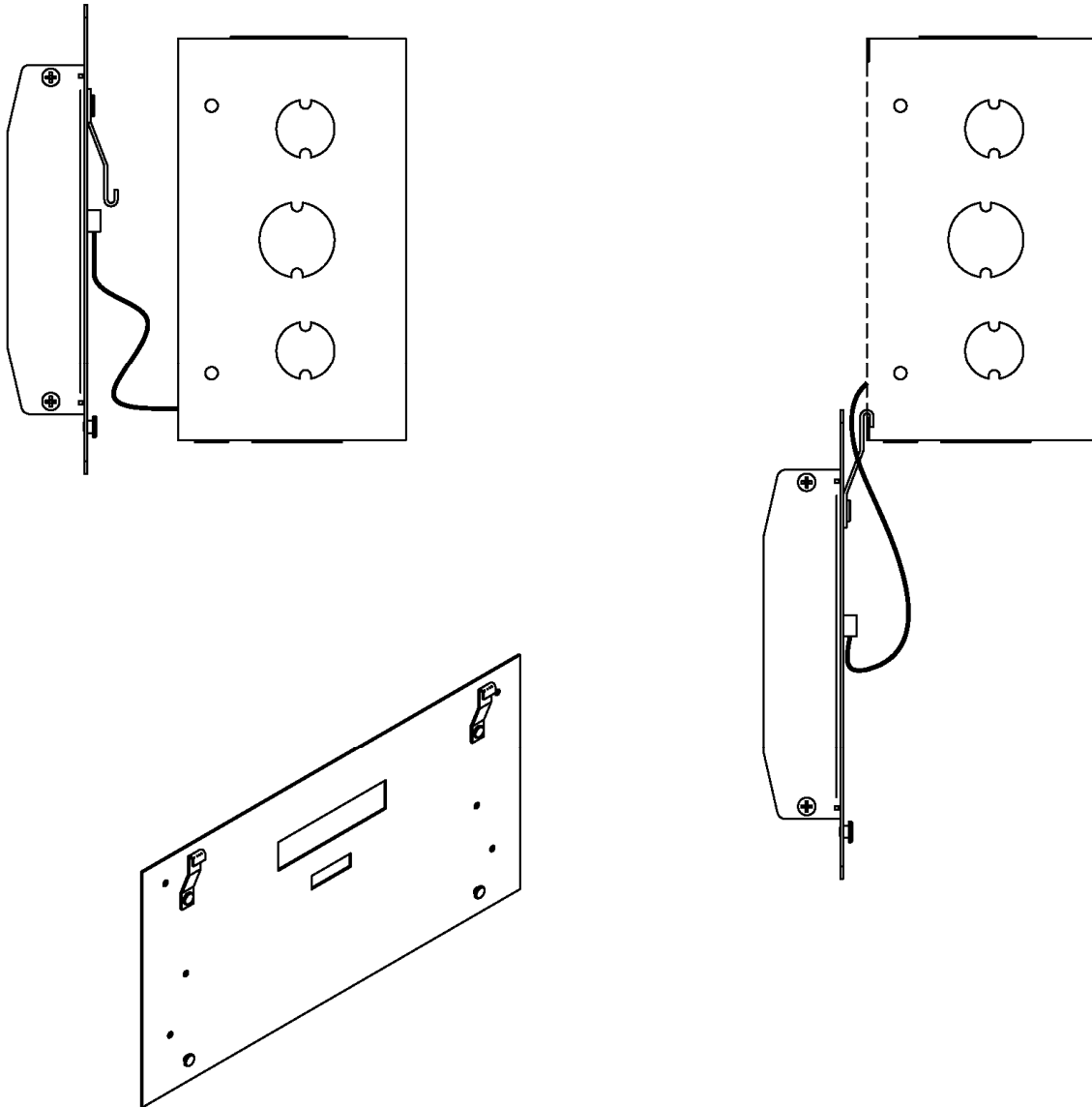
You can set the power supply portion of the Master into the wall. See the steps below and refer to the Surface Mount drawing to semi-flush mount your Master. A competent electrician should mount the Power Supply Box inside the wall

To semi-flush mount the Master

1. Place the Master on its back with the display unit facing up and the keypad to the right
2. Remove the two screws from just above the display unit
3. 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
4. Unplug the ribbon power cable from the back of the display unit
5. Set the display unit aside
6. The power supply measures 12" wide x 6" high x 3 3/8" deep. The cover extends 1/2" around the 12" x 6" dimensions. Cut a hole roughly 12 1/4" x 6 1/4" in the wall between two studs where you want to hang your Master
7. Cut two blocks of wood for filler and attach them to the studs
8. Using the two holes on each side of the power supply, screw it to the blocks
9. Follow the wiring steps in step 2
10. Plug the ribbon cable
11. Replace the display unit using the two screws that you earlier removed

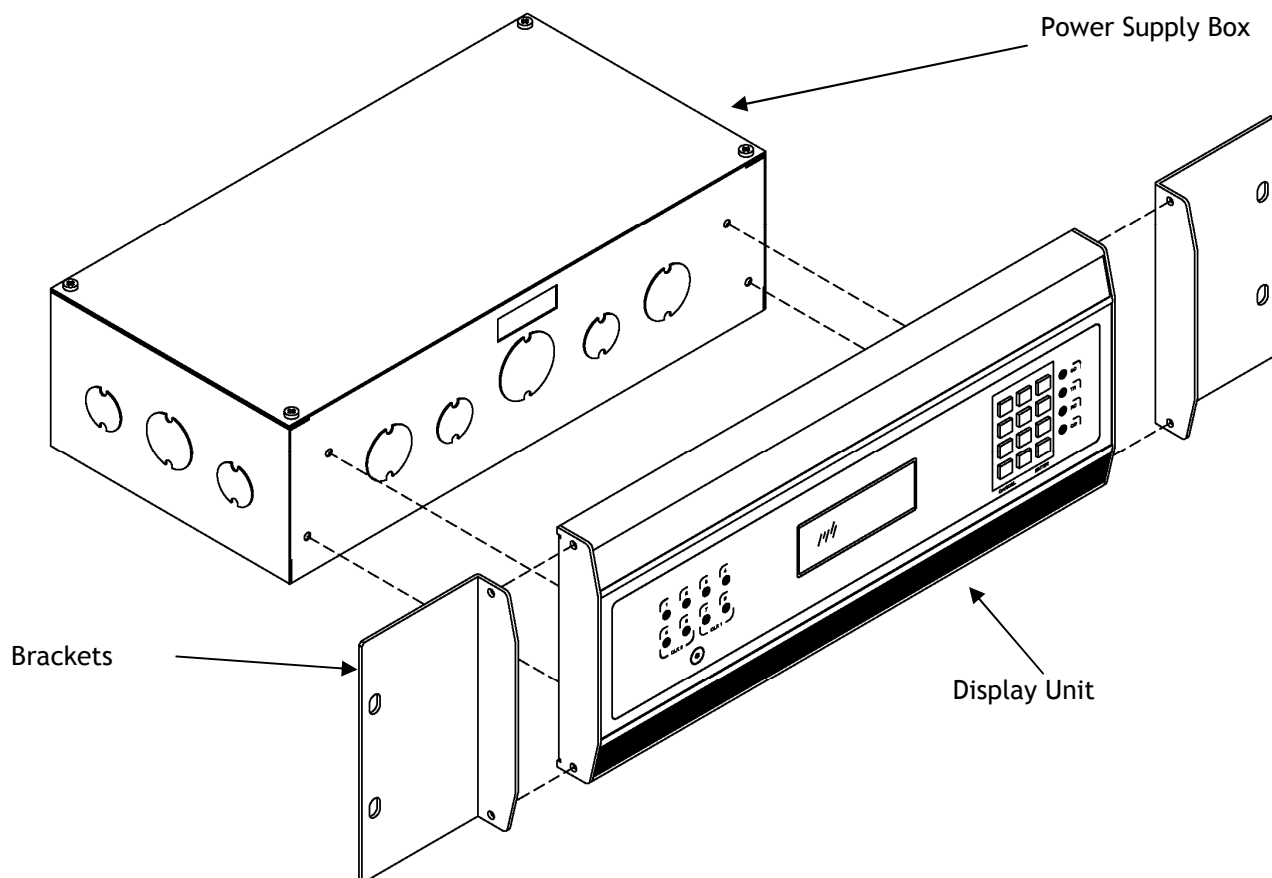
Lowering the Display Unit during Testing

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



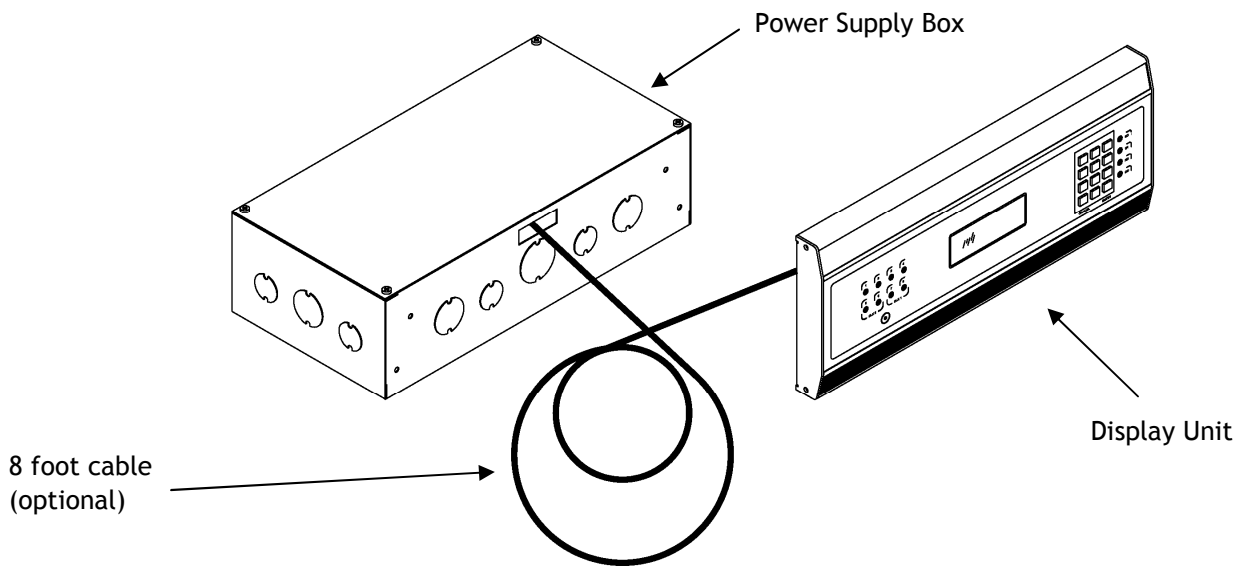
To install the Master in a 19-inch rack

1. Place the Master on its back with the display unit facing up and the keypad to the right
2. Remove the two screws from just above the display unit
3. 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
4. Unplug the ribbon power cable from the back of the display unit
5. Set the display unit aside
6. 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)
7. Remove the rectangular knockout near the top of the power supply
8. 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
9. Plug the ribbon cable from the power supply into the display unit

10. Remove the two screws from the side of the display unit
11. Using these same screws, attach an "L" bracket (or ear)
12. Repeat to attach the other ear
13. Mount the unit in the rack
14. Follow the wiring steps in the next chapter before attaching the box cover
15. 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



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
- Pass the end of the 8-foot connection cable with the Ground wire through the opening using proper strain relief hardware.
- Connect the communication cable. When properly installed, the cable will face away from the transformer

Attach the ground wire to one of the lower power supply mounting screws

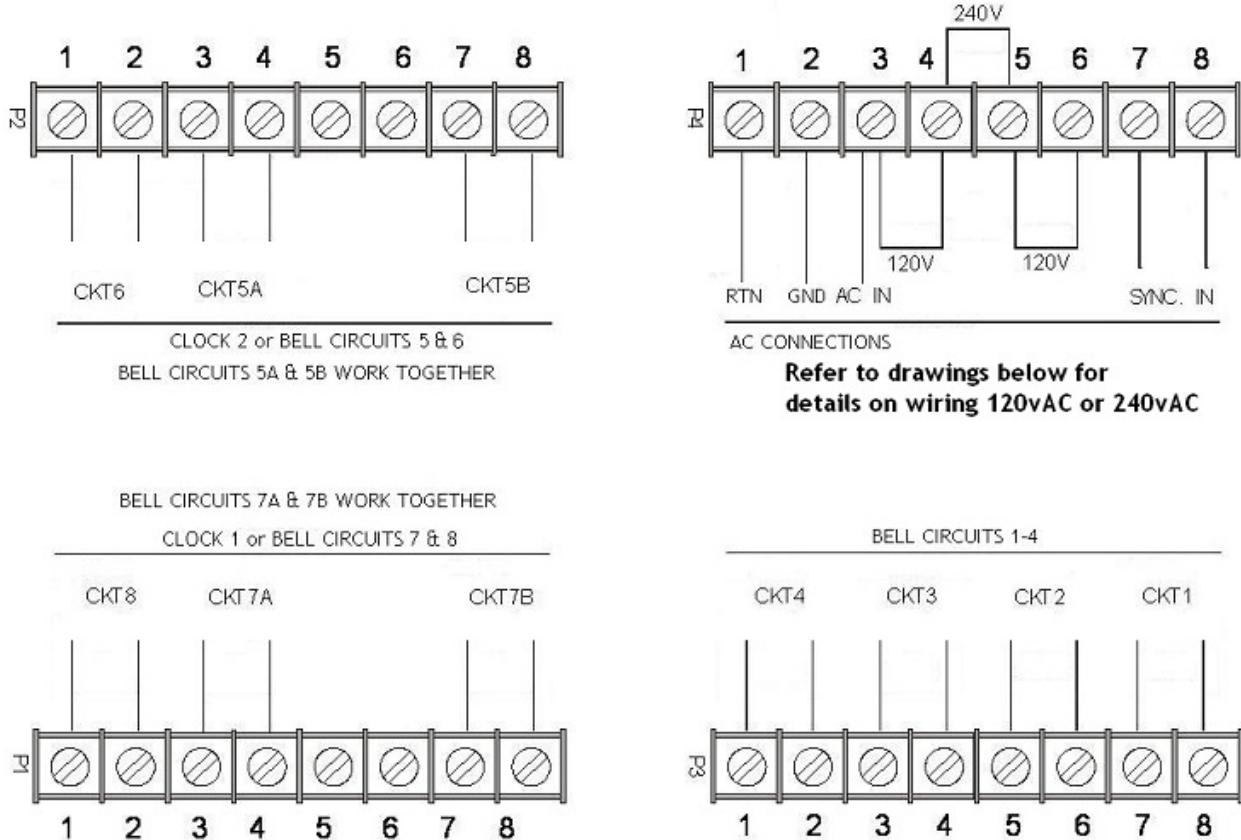
Note: UL regulations require that you do NOT place high voltage (120V) and low voltage communication cables in the same conduit or through the same knockout holes

- Follow the wiring steps in step 2
- 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)

Step 2 - Wiring the Master

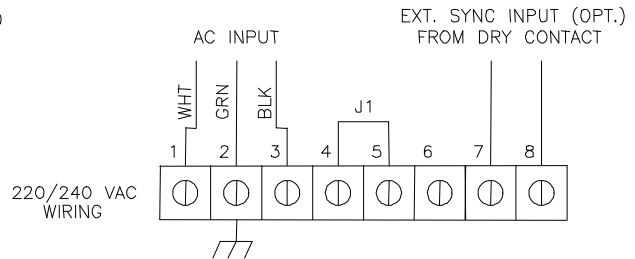
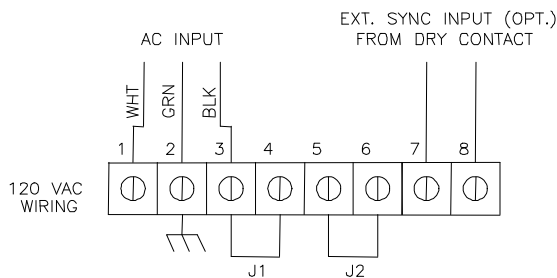
Wire the display panel and power relay units for bell control and clock synchronization. Refer to the diagrams in Appendix C2 for more details. **Until you complete this part of the wiring, do not turn on the AC power to P4, and keep the power/relay unit's toggle switch turned "OFF"**
 (Note: The LTR4-512 does not contain Terminal Block P3)

Power Supply - LTR8

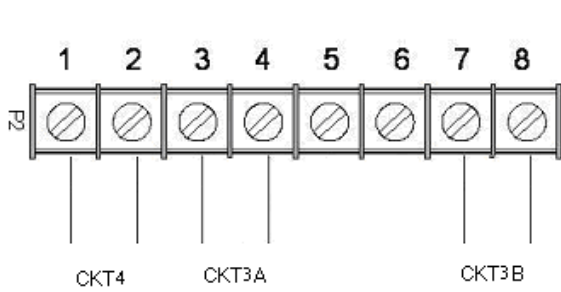


TERMINAL BLOCK 'P4'
WIRING THE LTR8-512 FOR 120VAC
 (nom.) OPERATION
 J1 installed between 3 & 4 and J2 installed between 5 & 6

TERMINAL BLOCK 'P4'
WIRING THE LTR8-512 FOR 220/240VAC
 (nom.) OPERATION
 J1 installed between 4 & 5

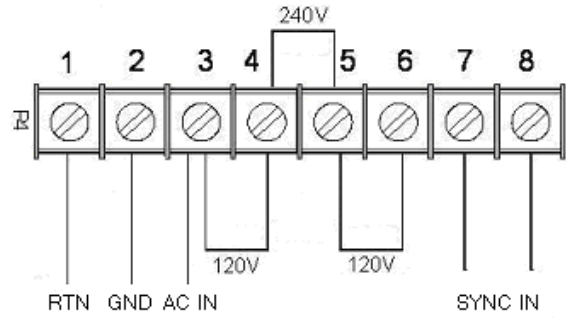


Power Supply - LTR4



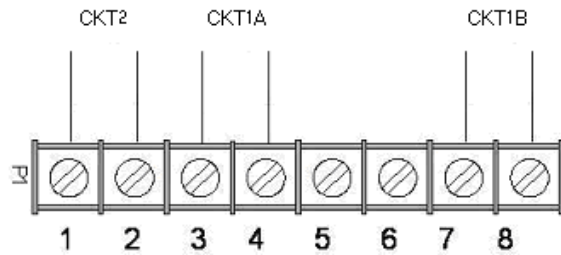
BELL CIRCUITS 3 & 4
CIRCUITS 3A & 3B WORK TOGETHER

CLOCK 1 or BELL CIRCUITS 1 & 2
CIRCUITS 1A & 1B WORK TOGETHER



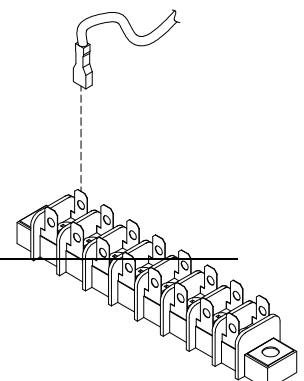
AC CONNECTIONS

Refer to drawings below for details on wiring 120vAC or 240vAC



<p>TERMINAL BLOCK 'P4' WIRING THE LTR8-512 FOR 120VAC (nom.) OPERATION</p> <p>J1 installed between 3 & 4 and J2 installed between 5 & 6</p>	<p>TERMINAL BLOCK 'P4' WIRING THE LTR8-512 FOR 220/240VAC (nom.) OPERATION</p> <p>J1 installed between 4 & 5</p>
<p>120 VAC WIRING</p>	<p>220/240 VAC WIRING</p>

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 on page 8.



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 C1 for the wiring diagram of your type clock. Appendix D 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, if 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)

Step 3 - Setting Up the Master

If you will use the Master to sync clocks, you must first use relays #7 & #8 (terminal block P1) for synchronizing. 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:

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

3A - Enter the 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. All factory programmed passwords can be spelled out using the letters of a telephone keypad. For example, the administrator password is 332537 or DEALER. Perform the following keypad entries to enter the administrator password.

Step	Press	See on Display
1	[#][0][#]	PASSWORD 000000
2	[3][3][2][5][3][7]	PASSWORD 332537
3	[#]	ADMINISTRATOR PASSWORD ACCEPTED

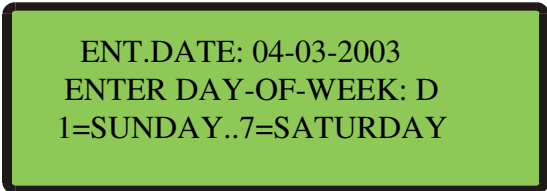
The display will return to the time and date after 3 seconds.

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

3B - Set the Date and Time

To set the date and time, select Function [1] by keying [#][1][#]

Enter the numbers for the month, date and year (4-digit year), then press [#], such as [0][4][0][3][2][0][0][3][#] shown below:

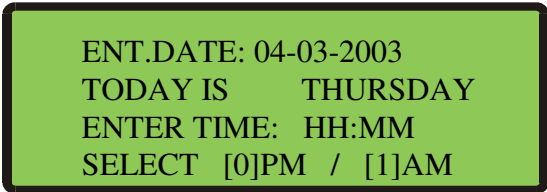


ENT.DATE: 04-03-2003
ENTER DAY-OF-WEEK: D
1=SUNDAY..7=SATURDAY

Enter a number [1] - [7] for the day of the week, Sunday through Saturday:

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

For example, if you press [5], the display shows

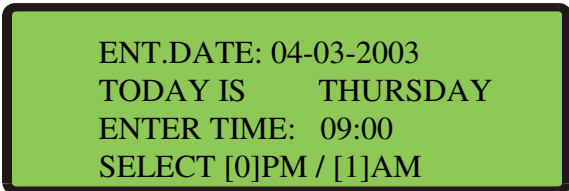


ENT.DATE: 04-03-2003
TODAY IS THURSDAY
ENTER TIME: HH:MM
SELECT [0]PM / [1]AM

Press [#] to confirm or [*] to try again

Once you press [#], enter the time of the **next upcoming minute**, using either 12-hour or 24-hour format, then press [#]. (If using 24-hour format, enter midnight as 00:00)

For example, if the current time is 08:59, enter: 09:00



ENT.DATE: 04-03-2003
TODAY IS THURSDAY
ENTER TIME: 09:00
SELECT [0]PM / [1]AM

If you enter a time less than 13:00 (1:00 PM), then you will see

SELECT [0]PM / [1]AM

Press [0] for PM or [1] for AM. If you choose 'PM', then the time will display in 24-hour format to confirm your entry

ENT.DATE: 04-03-2003
 TODAY IS THURSDAY
 ENTER TIME: 21:00
 PRESS [#] IF CORRECT

Press the [#] key at the top ('00' seconds) of the new minute to accept. If the time or date is incorrect, press [*] to cancel and try again.

The display will now show the time and date you just entered. You can toggle between the 12-hour and 24-hour display using "Quick Check" command [3]

Make sure you enter the correct date and day, because the schedules you setup depend on the accuracy of these choices

3C - 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

Step	Press	Display
1	[#]	SELECT FUNCTION CODE
2	[6]	[6] =ENABLE CIRCUITS
3	[#]	SELECT ACTIVE BELL ZONES 12345678 CLOCK CKTS PRESS [#] IF CORRECT
4	[1] - [8]	Enter the circuit numbers that you want to enable or disable.
5	[#]	When you see all the circuit numbers you want enabled, press [#]

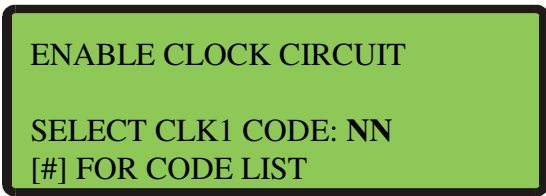
3D - Choose Clock Types

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, following the instructions below. Clock Control Codes can be found in Appendix C1.

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 ATX6) using the Master's RS-485 SYNC ports

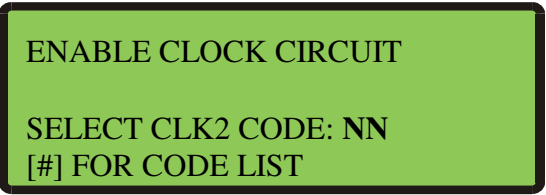
NOTE: The LTR4-512 can only synchronize one type of secondary system

Start this function by pressing [#][2][#]



ENABLE CLOCK CIRCUIT
SELECT CLK1 CODE: NN
[#] FOR CODE LIST

Enter the 2-digit code for CLOCK CIRCUIT 1, then press [#]. If you entered a code other than '00', and you have a LTR8-512 or LTR8-512M, you will see



ENABLE CLOCK CIRCUIT
SELECT CLK2 CODE: NN
[#] FOR CODE LIST

Enter the code for CLOCK CIRCUIT 2, or [0][0] if you will not use a CLOCK2, then press [#]

PRESS [#] IF CORRECT

Enter [#] to confirm or [*] to cancel and try again.

For future reference, write the programmed Clock Type Codes on the lines, below:

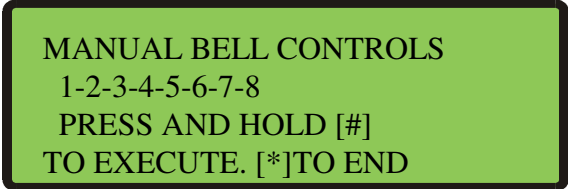
Clock Circuit 1: _____

Clock Circuit 2: _____

3E - Test Bell Circuits

Manual Bell Control

Use Manual Bell Control Function [3] (described on Pg. 20 to test selected bell circuits. Press [#][3][#] to start this function



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

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

3F - Set Daylight Savings

Your Master comes set to adjust for Daylight Savings Time in the United States. If you live outside the United States or if your region does not observe daylight savings, use Function [7] (Described on Pg. 26); otherwise, skip to Step 3g.

3G - Setup Communication

The “factory default” communication settings (LTR8-512 and LTR8-512M only) are:

Baud Rate:	9600
Terminal ID#:	065

Use Function [B] (described on Pg. 30) if you if you need to change these settings for MasterLink configurations involving multiple Masters,

You can setup your LTR8-512 with LTR MasterLink using RS-232 (serial), RS-485 (networked), Modem (remote), or Ethernet (requires TXTOSEK accessory) Communications.

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

Congratulations! You have finished the basic setup of your LTRx-512 Master.

Basic Setup is Complete!

All of the programmed parameters have been stored in the Master's protected memory and will be retained in the event of power failure, brown-outs, etc.

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

<u>Press</u>	<u>Display</u>
[#]	SELECT FUNCTION CODE
[0]	[0]=ENTER PASSWORD
[#] 99 [#]	PASSWORD: 000099

Additional Functions:

All of the Master's functions are described in the next section of this guide. Remaining steps, which may be performed "as needed" by the Installer or User, include the following:

Function Number	Programming Operation
0	Enter Password
1	Set Date / Time
3	Manual Bell Control (Immediate Activation)
4	Program Bell Schedules
5	Program Schedule Change Dates
8	Change Active Schedule
9	Synch Clocks (after Wall Clock power failure)
A	Program Holidays
C	Change User Password

In particular, most Users will want to execute the following steps:

Enter their User Password (Function [0]),
Program Bell Schedules (Function [4]) and
Make at least one Bell Schedule "Active" (Function [8]).

Users may also want to:

Program Schedule Change Dates (Function [5]) for automating schedule changes
Program Holidays (Function [A]) if bells should not ring on those occasions
Change User Password (Function[C]) to prevent unauthorized tampering

Users who are unfamiliar with the technical specifications of the installation are urged to avoid accessing functions that require the Administrator Password, as incorrectly reprogramming any of the configuration parameters (Functions 2, 6, 7, B) could cause the system to function improperly.

Function Descriptions

- [#] 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 "corner 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 [#]

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

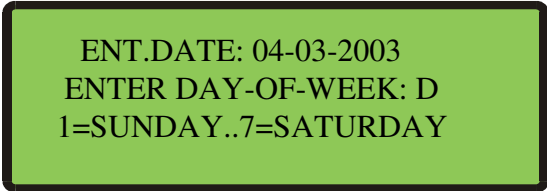
The administrator password 332537 [DEALER] allows you to access advanced functions. Functions that require the Administrator Password are [2] Select Clock Control, [6] Enable Circuits, [7] Daylight Savings, and [B] Communications

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 (#0#), then [#][1][#]

Enter the numbers for the month, date and year (4-digit year), then press [#], such as [0][4][0][3][2][0][0][3][#] shown below:

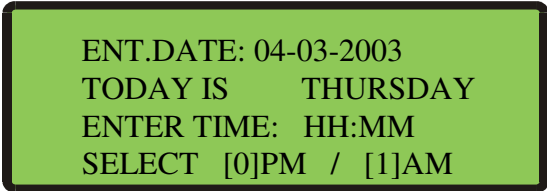


ENT.DATE: 04-03-2003
ENTER DAY-OF-WEEK: D
1=SUNDAY..7=SATURDAY

Enter a number [1] - [7] for the day of the week, Sunday through Saturday:

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

For example, if you press [5], the display shows

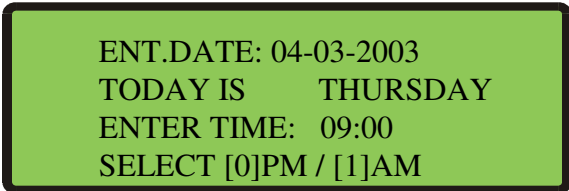


ENT.DATE: 04-03-2003
TODAY IS THURSDAY
ENTER TIME: HH:MM
SELECT [0]PM / [1]AM

Press [#] to confirm or [*] to try again

Once you press [#], enter the time of the **next upcoming minute**, using either 12-hour or 24-hour format, then press [#]. (If using 24-hour format, enter midnight as 00:00)

For example, if the current time is 08:59, enter: 09:00

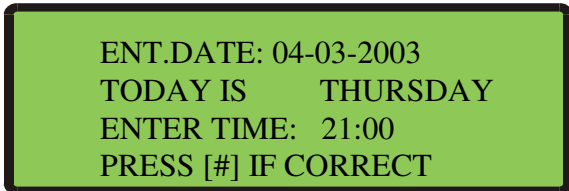


```
ENT.DATE: 04-03-2003
TODAY IS THURSDAY
ENTER TIME: 09:00
SELECT [0]PM / [1]AM
```

If you enter a time less than 13:00 (1:00 PM), then you will see

SELECT [0]PM / [1]AM

Press [0] for PM or [1] for AM. If you choose 'PM', then the time will display in 24-hour format to confirm your entry



```
ENT.DATE: 04-03-2003
TODAY IS THURSDAY
ENTER TIME: 21:00
PRESS [#] IF CORRECT
```

Press the [#] key at the top ('00' seconds) of the new minute to accept. If the time or date is not correct, press [*] to cancel and try again.

The display will now show the time and date you just entered. You can toggle between the 12-hour and 24-hour display using "Quick Check" command [3]

Make sure you enter the correct date and day, because the schedules you setup depend on these choices

[2]=Select Clock Control

This function requires the administrator password

Use this function to choose the make/model of the clocks that your Master will synchronize (Note: The LTR4-512 can only synchronize one type of secondary system)

Enter your administrator password, then start this function by pressing [#][2][#]

ENABLE CLOCK CIRCUIT

SELECT CLK1 CODE: NN
[#] FOR CODE LIST

Enter the 2-digit code for CLOCK1, then press [#]. If you entered a code other than '00', and you have a LTR8-512 or LTR8-512M, you will see

ENABLE CLOCK CIRCUIT

SELECT CLK2 CODE: NN
[#] FOR CODE LIST

Enter the code for CLOCK2, or [0][0] if you will not use a CLOCK2, then press [#]

PRESS [#] IF CORRECT

Enter [#] to confirm or [*] to cancel and try again

[3]=Manual Bell Control

This function does not require a password

Use this function to test bell circuits or to sound a bell during an unscheduled time, such as a fire alarm. Press [#][3][#] to start this function

MANUAL BELL CONTROLS

1-2-3-4-5-6-7-8

PRESS AND HOLD [#]
TO EXECUTE.[*]TO END

The 2nd line of the display only shows the circuit numbers (1-8) that are available for bell controls

Press [0] to turn them all off, or press keys [1] - [8] to turn a circuit off or on

When you see the circuits that you want to ring, press and hold the [#] key. The front panel lights will light up to show that you have turned on those relays. Release the [#] key to turn those relays back off. Note that the relays scheduled to turn 'on' will cycle as programmed

You can now sound other circuits, or press [*] to quit

Note: When your CLOCK1 Type is Type 14 (Electronic Coded) or Type 15 (Straight Frequency), you may need to hold the [#] key for about a minute to energize your bell circuits. You will know that your circuits have turned on when the green front panel lights for those circuits light up

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

[4]=Program Schedules

Use this function to set bell schedules. A schedule lists the days and times when the bell circuits will turn on. Your Master can have up to eight (8) different bell schedules with up to sixty-four (64) 'events' per schedule. If needed, you can make several schedules active at the same time to increase the number of events to as many as 512 (8 multiplied by 64). In fact, each 'event' can trigger several 'actions'. For example, you can program a single event to turn on relays #1, #2 and #4 for 7 seconds at 08:00 AM on Tuesdays, Thursdays and Holidays

Enter your password (#0#), then press [#][4][#] to start programming schedules



SCHEDULE PROGRAMMING
SELECT SCHEDULE # N

Press Schedule Number [1] - [8]. Normally, start with [1]

The following will show on the display:

For Firmware version 4.05 and earlier:

```

SELECTED SCHEDULE #1
SELECT [1]DATA ENTRY
       [2]DATA SCAN
       [3]DATA EDIT
    
```

For Firmware version 4.06 and later:

```

SELECTED SCHEDULE #1
SELECT
  [1]ENTRY  [2]SCAN
  [3]EDIT   [4] CLEAR
    
```

To select the appropriate mode:

- Press [1] DATA ENTRY to create a new schedule
- Press [2] DATA SCAN to view a schedule
- Press [3] DATA EDIT to change a schedule
- Press [4] CLEAR to clear all records in the selected schedule

When you choose [2] DATA SCAN, you can view events. You can use these scan keys:

Scan Key	Description
[9] 1ST	Go to the 1 st event (in ascending time order)
[3] PRV	View the previous event
[#] NXT	View the next event
[*] EXIT	End and exit

When you choose [3] DATA EDIT, you can view, edit or delete events. You can use the keys above, plus these edit keys:

Edit Key	Description
[1] EDIT	Edit the displayed event
[4] DEL	Delete the displayed event
[6] ADD	Add a new event

When you choose [1]DATA ENTRY, you can create a schedule. Follow the steps below to create a schedule

```

SELECTED SCHEDULE # 1
SELECTED MODE = ENTRY
ZONE TYPE = BELL
PRESS [#] TO EXECUTE
    
```

Press [#] to accept.

Then select the days when this event occurs

[0] selects no days, [1]-[7] selects Sunday-Saturday, [8] selects holidays and [9] selects all days (including holidays). Press these keys to turn days on or off. After you choose the days when the event will occur, press [#]

Example: Press 1,3,5,7,8 to turn off all days except Monday, Wednesday and Friday

```
SELECT DAYS: S M T W T F S H
              2  4  6
```

Select which circuits will turn on for this event

Example: Press 1,2,3,4, to turn on circuits 1, 2, 3 and 4

```
ACTIVE DAYS: M W F
SELECT CKTS: 1234
```

Enter the event start time in 12-hour or 24-hour format. If you enter a time earlier than 13:00 (1:00 PM), then press [1] to change PM to AM

```
ACTIVE DAYS: M W F
SELECT CKTS: 1234
ENTER START: HH:MM  P
```

The menu will ask for the bell length (SECONDS ON)

Enter how many seconds this event lasts. The bell length shows 3 seconds (or 5 seconds if your CLOCK1 is Type 15). To accept, press [#], or enter another value from 01-99 seconds, then press [#]

```
ACTIVE DAYS: M W F
SELECT CKTS:1234
START TIME  : 08:00 A
SECONDS ON  : 03
```

Your Master saves these values in the schedule then displays SELECT DAYS again, waiting for you to enter another event. Once you finish entering events, you can quit by pressing [*]

Make sure you use Function 5 or Function 8 to activate your schedules

[5]=Schedule Changes (Use the handy programming charts included at the end of this Guide)

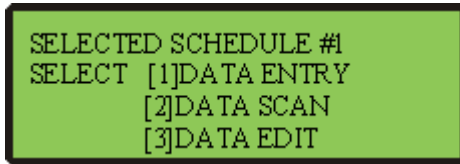
If you wish to activate schedules at a future date, use Schedule Changes to program a schedule's start date and time. This function works much like the Bell Schedule Function [4]. Enter your password (#0#), then press [#][5][#]

To select the appropriate mode:

- Press [1] DATA ENTRY to create a new schedule
- Press [2] DATA SCAN to view a schedule
- Press [3] DATA EDIT to change a schedule
- Press [4] CLEAR to clear all records in the selected schedule

The following will show on the display:

For Firmware version 4.05 and earlier:



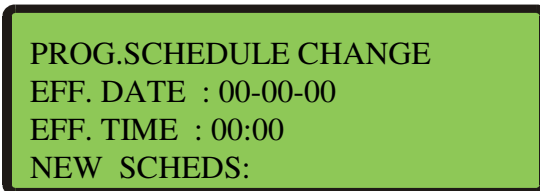
```
SELECTED SCHEDULE #1
SELECT  [1]DATA ENTRY
        [2]DATA SCAN
        [3]DATA EDIT
```

For Firmware version 4.06 and later:



```
SELECTED SCHEDULE #1
SELECT
  [1]ENTRY  [2]SCAN
  [3]EDIT   [4] CLEAR
```

After making your choice, you will see



```
PROG.SCHEDULE CHANGE
EFF. DATE : 00-00-00
EFF. TIME : 00:00
NEW SCHEDULES:
```

Enter the date and time, then press the schedule number (1-8) for each schedule to activate at that date and time. **You do not need to press [#] after you enter each value - only press [#] after entering the last New Schedule on line 4.**

After you enter each change, the menu gives you the chance to enter, scan or edit another one. Or press [*] to quit.

The Master will hold up to 16 programmed changes. Once your change occurs, your Master clears it from memory, making room for you to enter more changes.

Note: Only the schedules entered in this function will activate at the Date and Time entered. Any schedules previously active will become inactive if not on the list of new schedules.

[6]=Enable or Disable Circuits

This function requires the administrator password.

Use this function to **Enable** and **Disable** your Master's control relays during circuit wiring or maintenance. This function can also 'hold back' clocks to manually adjust for daylight savings in the fall if you have chosen not to use Function 7 "Daylight Savings".

[7]=Daylight Savings

This function requires the administrator password.

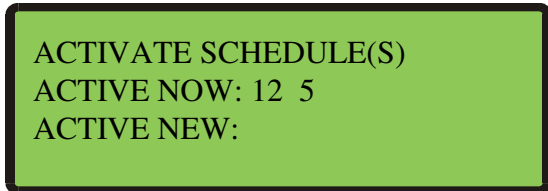
Your LTRx-512 knows the daylight savings time (DST) settings for over 75 countries. By using the 2-digit "country code", your LTRx-512 will automatically adjust for daylight savings time.

Step	Press	See on Display
1	[#][7][#]	ENTER COUNTRY CODE FOR DAYLIGHT SAVINGS TIME ADJUSTMENT:
2	Enter new Code	
3	[#]	Return to time and date display

If you own the LTR8-512 or LTR8-512M and if your nation does not appear in the Country Code list or if the dates for Daylight Savings in your country have changed, you can choose code '00' and use the optional LTR MasterLink software to program when the clock adjustments should occur.

[8]=Change Active Schedule

Use this function to run a schedule that you setup in function [4]=PROGRAM SCHEDULE. Enter your password (#0#), then press [#][8][#] to change a schedule. You will see a display similar to the following:



In this example, the display shows that Schedules #1, #2 and #5 are all active now. You can think of this as 3 schedules of up to 64 events used together to make 1 large schedule of up to 192 events. Press [1] - [8] to select the schedules you wish activated immediately. The [0] key turns all schedules off. When the ACTIVE NEW line shows the schedules that you want active, press [#]. Be sure that all schedules that you want active show on this line, even if they were already active.

You will see

PRESS [#] TO EXECUTE

Press [#] again, and your choices on ACTIVE NEW will activate now. Or, press [*] to cancel without making any changes

Schedules that you make active here will stay active until you change them again or until the Date and Time of the next Schedule Change [5] is to occur.

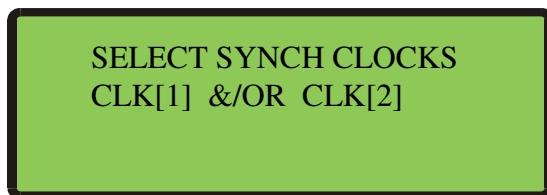
[9]=Sync Clocks

Use this function to quickly sync any secondary clocks that lose time. This can occur if power to your LTRx-512 stayed on while power to the secondary clocks stopped.

Note: This function is primarily used during initial installation of the secondary system, if there has been maintenance of the system requiring the power to be turned off, or other special circumstance. The Master Clock should keep your secondary clocks on time based on the type and style of correction the system is using.

Enter your password (#0#), then press [#][9][#]. You will see a display similar to the following:

Note: CLK[2] appears on the LTR8-512 and LTR8-512M only



Since only one of the clock circuits may have lost power, you can choose to re-sync CLOCK1, CLOCK2 or both.

Press [1] to turn on or off this display:

ADVANCE CLK1

Press [2] to turn on or off this display (you will see this option only if your clock is setup for 2 Clock Systems.):

ADVANCE CLK2

After choosing which clock circuits to sync, press [#].

If your clocks are synchronous types (01, 03, 06, 18, 19 & 22), they can only advance to the start of the nearest hour and will then wait for the Master Clock to catch up. If your clocks are impulse types, then you will see

Enter the time shown on the secondary clocks that have lost time and then press [#]. You will see

PRESS [#] TO EXECUTE

To sync the secondary clocks, press [#], or press [*] to cancel. Your impulse clocks will advance to your LTRx-512's time

NOTES:

1. The Clock Sync function does not support Clock Types 14, 15 or 24
2. When a Power-On Clock Recovery or user-initiated clock sync occurs, your LTRx-512 will not accept other commands to start clock synchronization
3. You can cancel Power-On Clock Recovery or user-initiated clock synchronization by choosing Clock Types again through function [2]=SELECT CLOCK CTL.


[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.

Examples:

- 1) Select SmtwtfSH for an event to occur on Sunday, Saturday, or any day setup as a Holiday, even if the holiday is other than Sunday or Saturday
- 2) Select sMTWTFsh for an event to occur Monday through Friday, unless the day is a holiday
- 3) Select SMTWTFSH for an event to occur every day, even on holidays

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

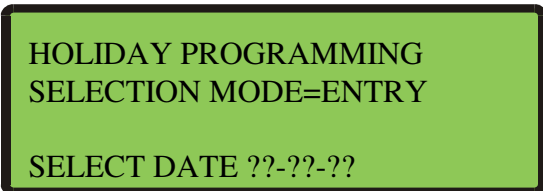


```
HOLIDAY PROGRAMMING
SELECT [1]DATA ENTRY
      [2]DATA SCAN
      [3]DATA EDIT
```

Use [1] to enter new holidays, [2] to view holidays and [3] to change or delete holidays

If you choose [1], you will see

Use keys [1] - [9] to enter a holiday in MM-DD-YY format, then press [#] to accept, or [*] to cancel



```
HOLIDAY PROGRAMMING
SELECTION MODE=ENTRY

SELECT DATE ??-??-??
```

The menu will now ask for another holiday. You can do so or press [*] to finish

Once your holiday occurs, your Master clears it from memory, making room for you to enter more holidays

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

This function requires the administrator password

Use this function if you use LTR MasterLink or Terminal Manager software with your LTR8-512

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

Use this function to enter the data transmission speed and terminal ID#

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

You can see your terminal ID# and baud rate by using the "Quick Check" command [*] when the LTR8-512 is in Clock Mode

[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][#]

NEW PASSWORD 000000

To keep your old password, press [*] to cancel

To change the password, enter a 6-digit number, then press [#]. You will see

PRESS [#] IF CORRECT

Press [#] to accept, or press [*] to cancel and try again

Once you change your password, your LTRx-512 will no longer accept the old password

You can always change your password again if needed

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° -115° F (0° -46° 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 <i>plus</i> Lathem DDC4R synchronization built-in; See Appendix B. One (1) of twenty-four (24) types <i>plus</i> Lathem DDC4R synchronization built-in; on the LTR4-512
Bell Zones and Schedules	Up to eight (8) zones [<i>less</i> two (2) for each electro-mechanical secondary clock type]. {Up to four (4) zones on the LTR4-512.} Eight (8) Schedules, <i>each</i> allowing sixty-four (64) multi-function events.
Daylight Savings Time	Supports DST standards for over 75 countries. See Appendix B.

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 FCC Part 68 / Canada ICES-003 - Class B
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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		

- 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

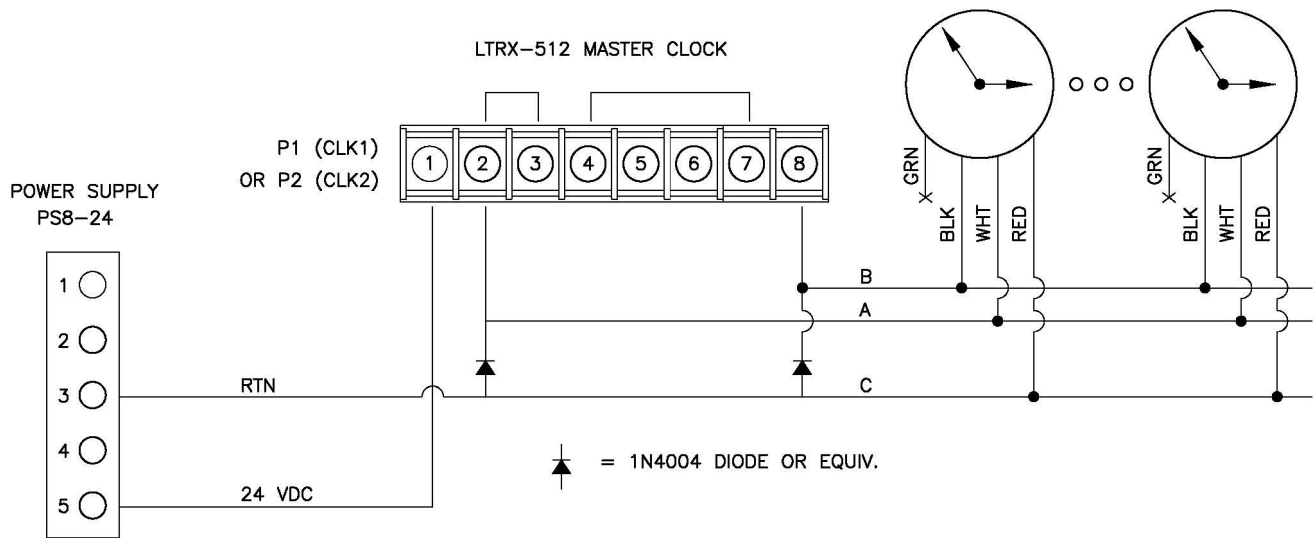
APPENDIX C1 - SECONDARY CLOCK TYPE CODES

Type	Description	Page	Type	Description	Page
01	SYNCHRONOUS WIRED	33	03	STANDARD EL SYNCH	36
01	LATHEM TYPE SS	33	03	AMR T&S X55BHGA801	35
01	CINCINNATI D10	33	04	STANDARD TM AR-2A	37
01	IBM 77 SERIES	33	05	3W MIN IMPULSE/58	37
01	SIMPLEX 77 SER	33	06	SYNCHRONOUS WIRED	38
01	SIMPLEX 93-9	33	06	CINCINNATI D8	38
01	SIMPLEX 91-9	33	06	FARADAY	38
01	SIMPLEX 941-9	33	06	HONEYWELL ST402A	38
01	SIMPLEX 943-9	33	07	DUKANE 24F200 DIG	37
01	SIMPLEX 6310-9231	33	08	RAULAND 2410 DIG	38
01	STANDARD EL D10,D12	33	09	SIMPLEX 2 MTR /59	38
01	STROMBERG 3000	33	10	SIMPLEX 2 MTR /45	39
02	3W MIN IMPULSE/59	34	11	EDWARDS DUAL MOTR	40
02	LATHEM ISC 3W	34	12	CINCINNATI D6	40
02	CINCINNATI D2-D4	34	14	ELECTRONIC CODED	41
02	DUKANE 24 SERIES	34	15	STRAIGHT FREQ.	41
02	EDWARDS IMPULSE	34	16	IMPLS 12HR COR/59	43
02	FARADAY IMPULSE	34	17	STANDARD TM AR2/3	43
02	IBM 75 SERIES	34	18	NATNL SYNC WIRED	44
02	SIMPLEX 74 SER	34	18	DUKANE 240 SERIES	44
02	SIMPLEX 91-4	34	19	STMBRG SYN WIR/56	44
02	SIMPLEX 93-4	34	19	LATHEM SS MODIF.	44
02	SIMPLEX 941-4	34	20	3W MIN IMPULSE/44	45
02	SIMPLEX 943-4	34	21	CINCINNATI D1	45
02	SIMPLEX 6310-9075	34	22	DUKANE SYNC WIRED	46
02	SIMPLEX 6310-9321	34	23	CONDOR 2412 DIG	46
02	STANDARD IMPULSE	34	23	RAULAND 2422 DIG	46
02	STROMBERG IMPULS	34	23	CONDOR BAR-AC-4412	47
02	LATHEM ISC 2W	34	24	EDWARDS SYNC E-1	48
02	CINCINNATID34	25	25	SPECIAL TEST.....	N/A34
			27	SIMPLEX 2310 DUAL MT	39

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

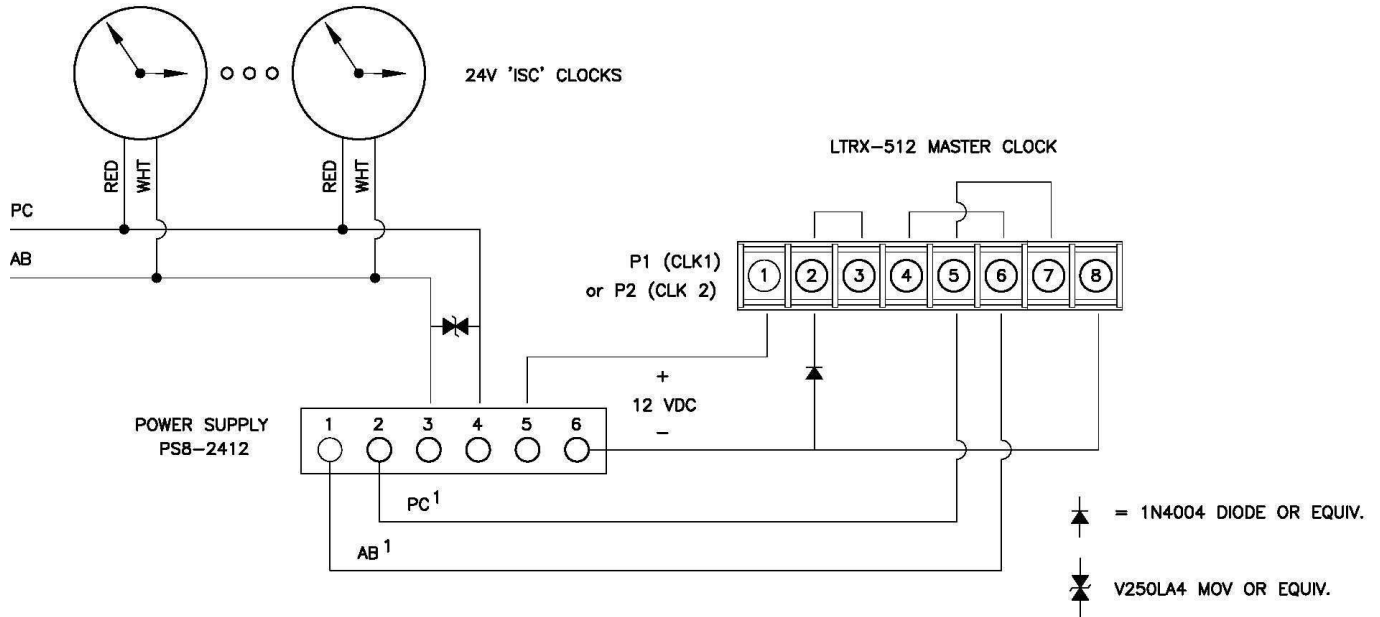


All circuits should be fused or protected by a circuit breaker (10Amp maximum)

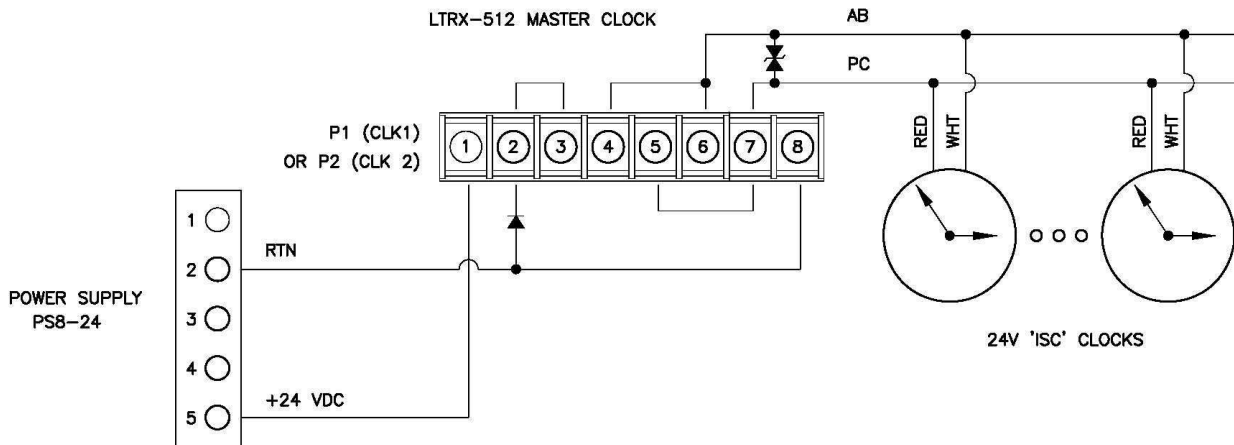
TYPE 02 - TWO WIRE REVERSE POLARITY MINUTE IMPULSE (59TH MIN.)

TYPES INCLUDE: Lathem Type ISC (2-Wire)
Cincinnati D3

Using PS8-2412 Power Supply:



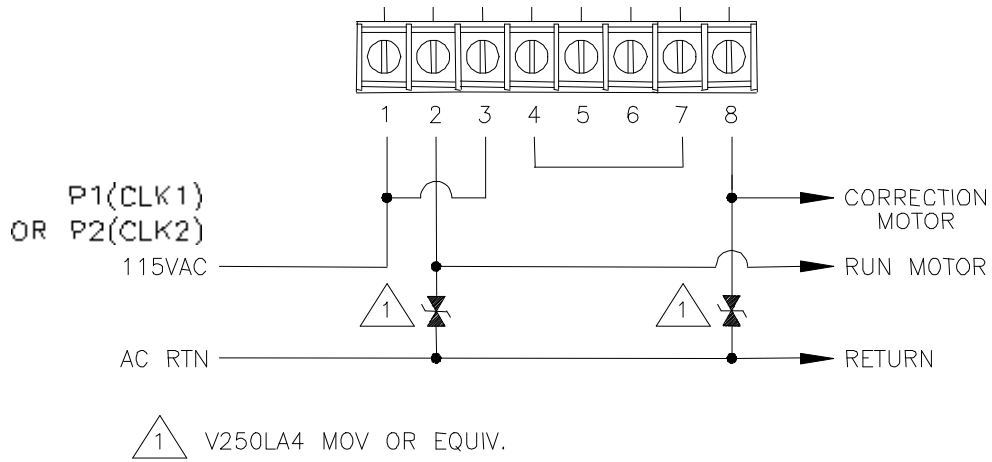
Using PS8-24 Power Supply:



* Green and Black Wires in Clock Cable are unused.

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

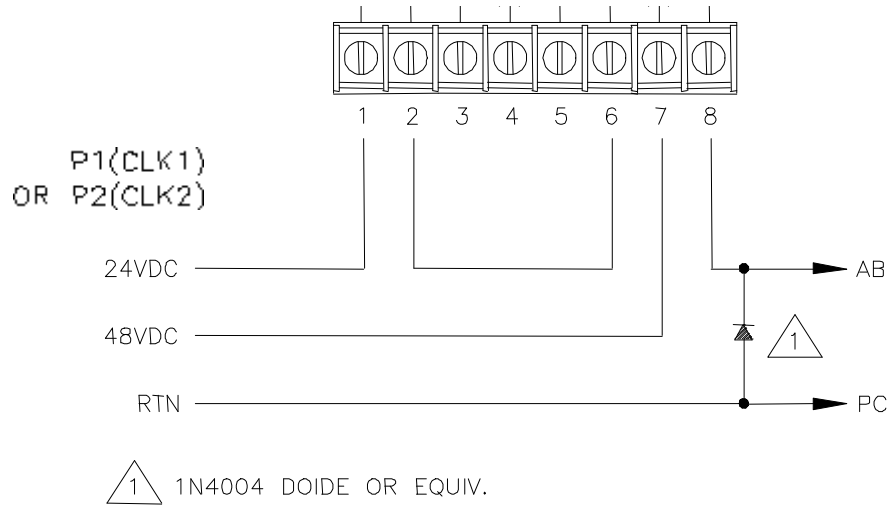
TYPE 03 - STANDARD ELECTRIC SYNCHRONOUS (*Old Style: Dual Motor)
 AMERICAN TIME & SIGNAL #X55BHGA801



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

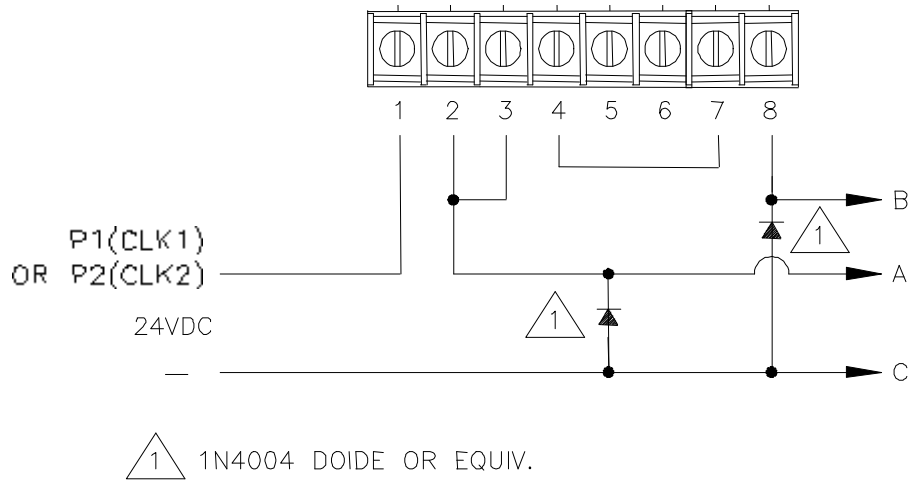
Note: For New Style (Motor+Solenoid), see Type 06 (Faraday)

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



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

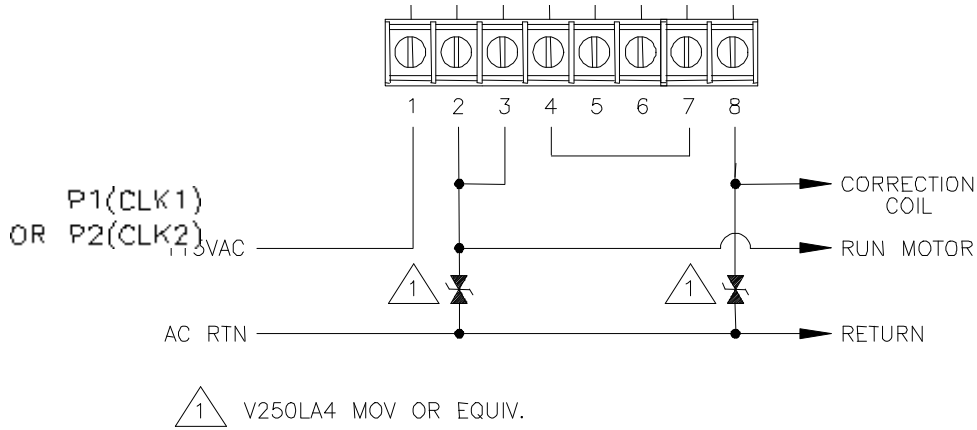
TYPE 05 - THREE WIRE MINUTE IMPULSE (58TH MIN.)



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

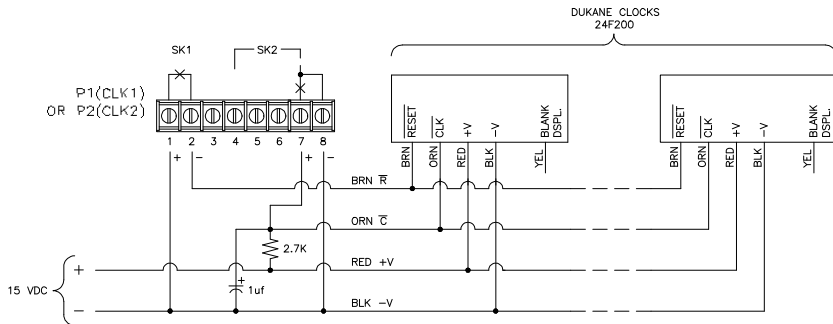
TYPE 06 - SYNCHRONOUS WIRED

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

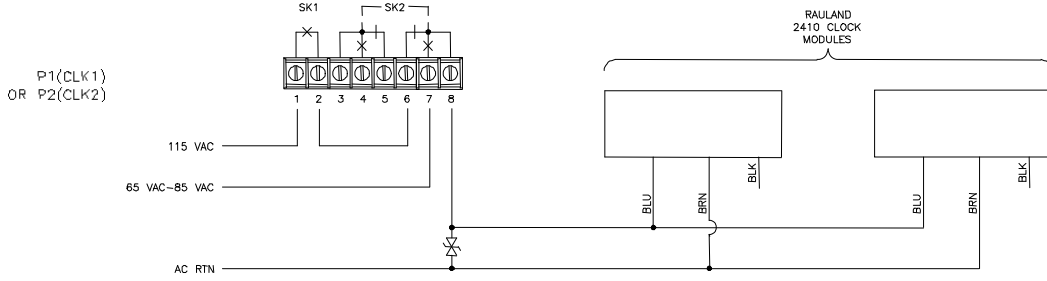


NOTE: THIS SELECTION IS NOT SUPPORTED ON THE LATHEM LTR8-512 OR LTR4-512 SERIES. CORRECTION FOR DUKANE 24F200 DIGITAL CLOCKS IS AVAILABLE ON THE DUKANE 24A715 SERIES MASTER CONTROL WITH SOLID-STATE RELAYS. CONTACT DUKANE CORPORATION OR YOUR DUKANE VENDOR.

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

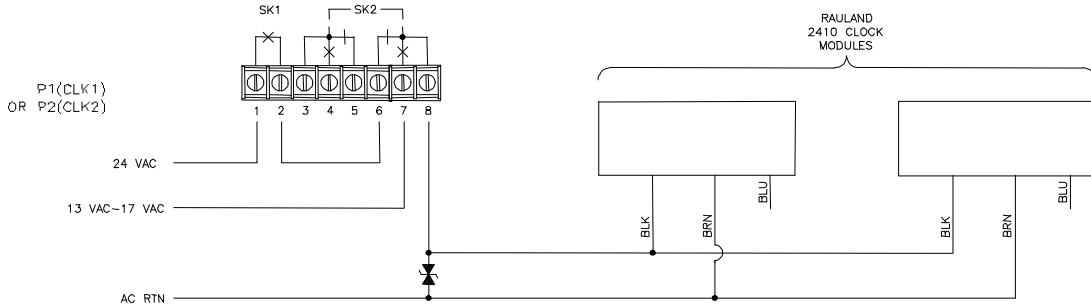
TYPE 08 - RAULAND 2410 DIGITAL CLOCKS (24VAC and 115VAC)

115VAC TYPE



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

24VAC TYPE



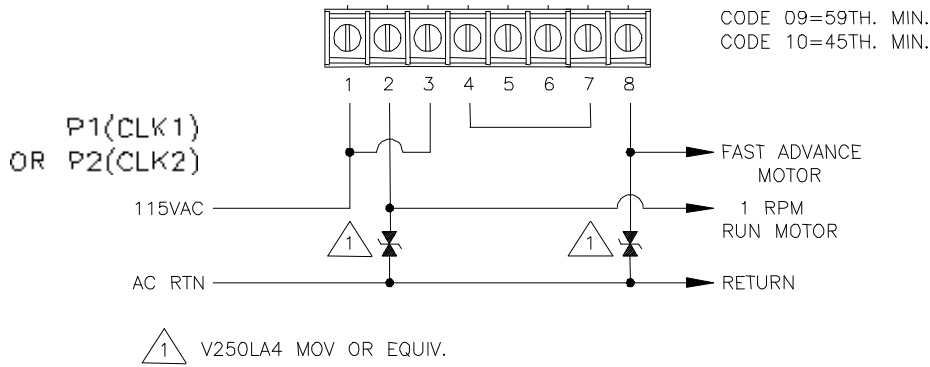
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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.

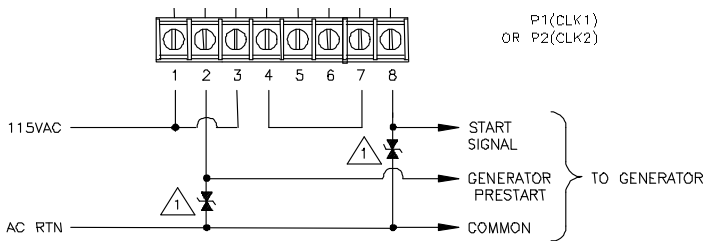


All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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 5:58:08, 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	} Bells should not be scheduled for: HH:58:SS	
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		



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

V250LA4 MOV OR EQUIV.

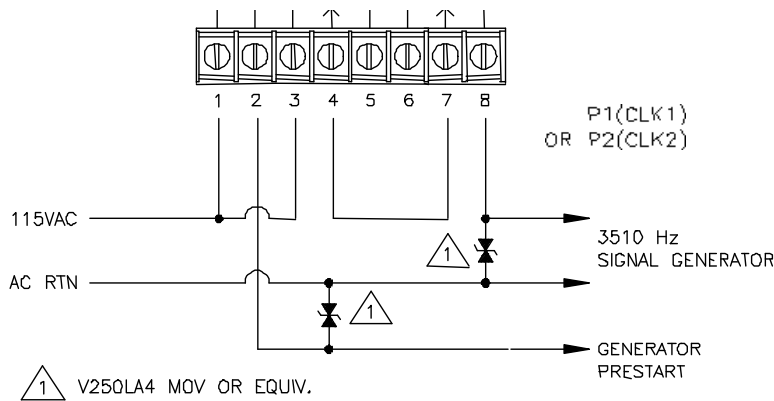
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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: HH:58:SS or 00:00:SS
Bell Ckt. 2		H:MM:05	H:MM:10	
Bell Ckt. 3		H:MM:10	H:MM:15	
Bell Ckt. 4		H:MM:15	H:MM:20	
Bell Ckt. 5		H:MM:20	H:MM:25	
Bell Ckt. 6		H:MM:25	H:MM:30	
SK2	(Hourly Correction) (12-Hour Correction)	H:57:54 5:57:54 5:58:08	H:58:02	
SK1	(Hourly Correction & 12-Hour Correction) (Bells)	H:57:00 35 sec of min previous to Bell	H:59:00 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

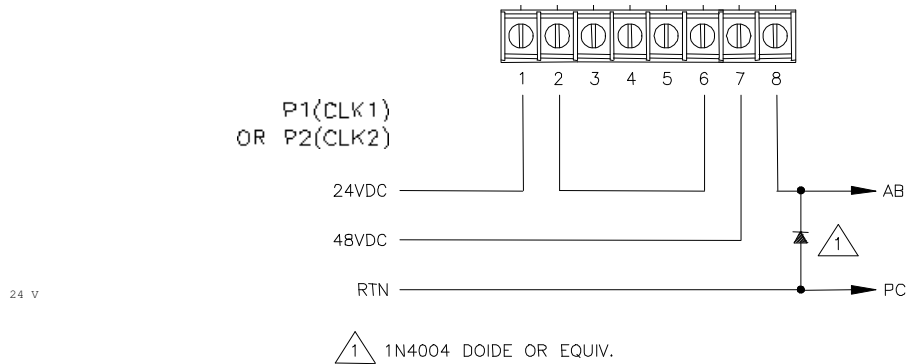
TYPES INCLUDE: Simplex 91 and 941

SAME WIRING AS FOR TYPE 02 (3-WIRE)

TYPE 16 - TWO WIRE REVERSE POLARITY MINUTE IMPULSE (59 MIN)
WITH 12-HOUR CORRECTION

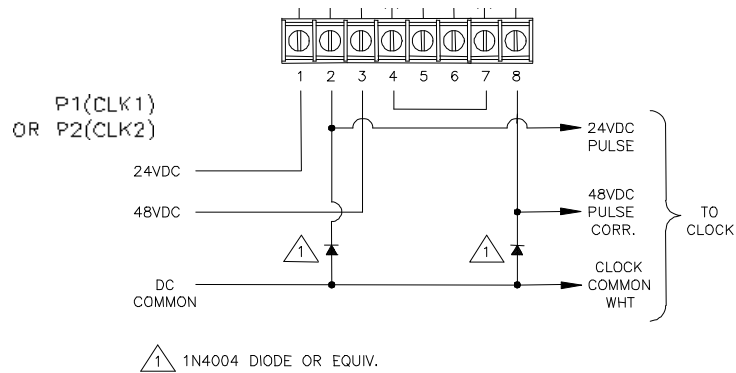
SAME WIRING AS FOR TYPE 02 (2-WIRE)

TYPE 17 - STANDARD ELECTRIC TIME AR-2 TWO WIRE DUAL VOLTAGE



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

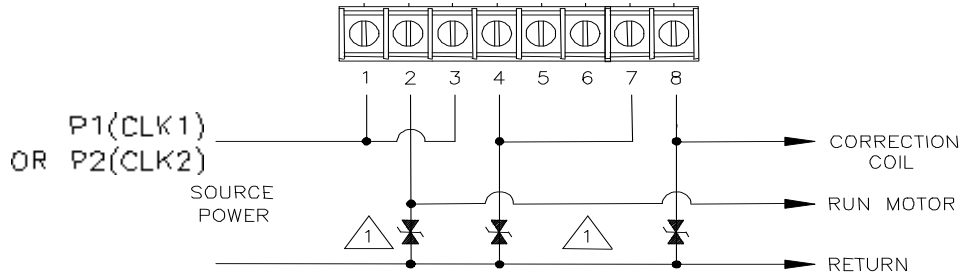
TYPE 17 - STANDARD ELECTRIC TIME AR-3 THREE-WIRE IMPULSE




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

TYPE 18 - NATIONAL SYNCHRONOUS WIRED

TYPES INCLUDE: Dukane 240 Series
 Rauland 2463 Series



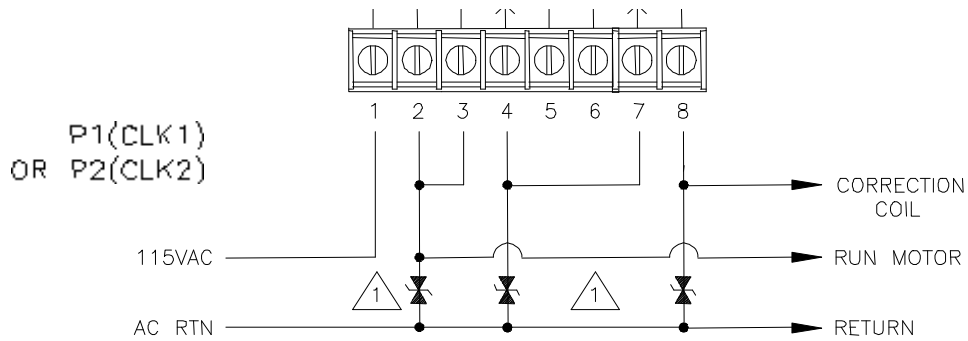
 V250LA4 MOV OR EQUIV.


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)

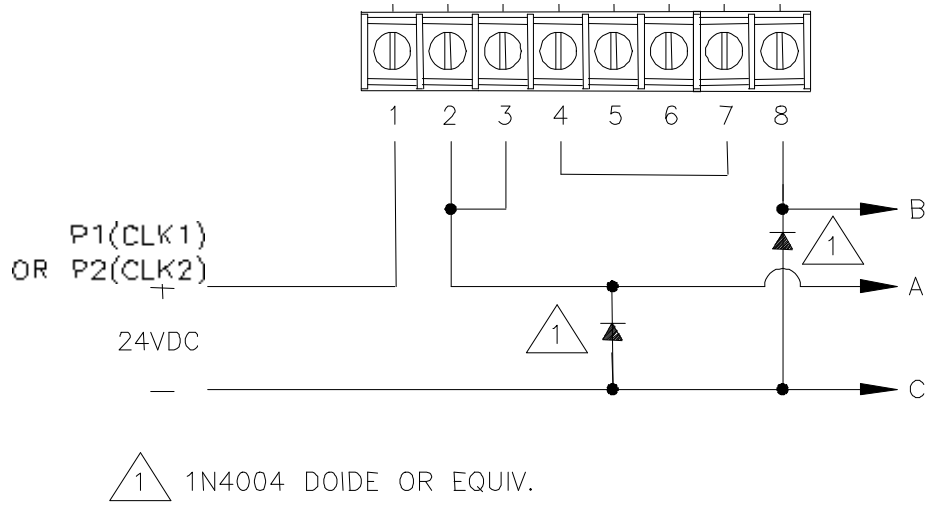
NOTE: Lathem type SS wall clocks can run according to the above signal operation if modified to reference the minute and second hands to HH:57:16 (versus HH:59:00) and the hour hand to 12 o'clock versus 6 o'clock.



 V250LA4 MOV OR EQUIV.

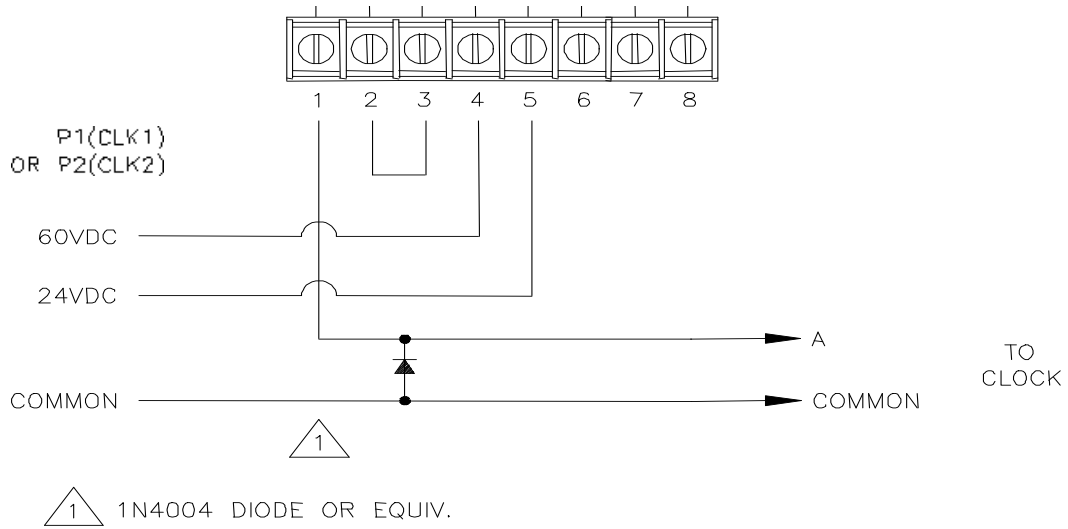
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 20 - THREE WIRE MINUTE IMPULSE (44TH MIN.)



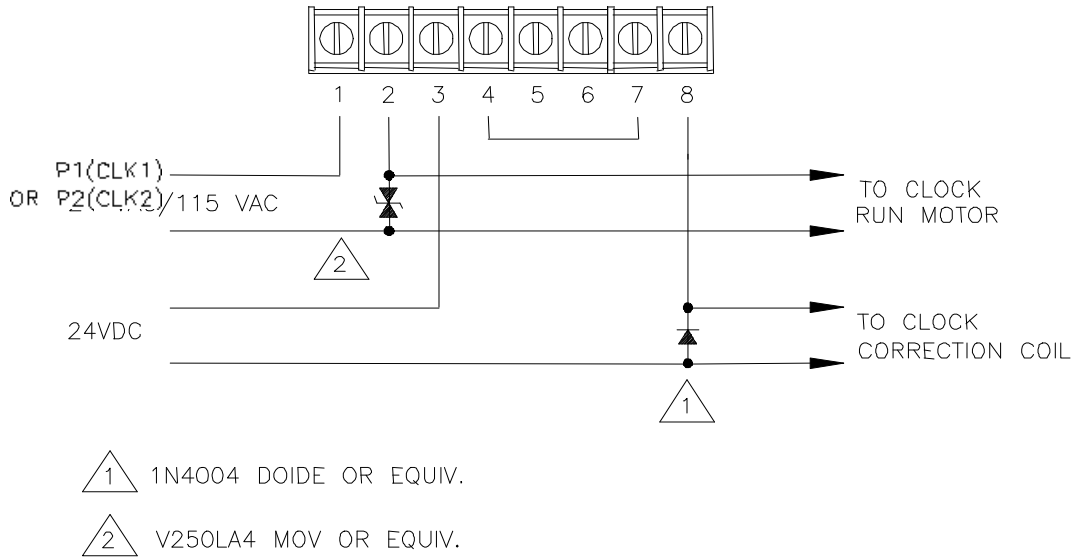
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 21 - CINCINNATI 'D1'



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

TYPE 22 - DUKANE SYNCHRONOUS WIRED

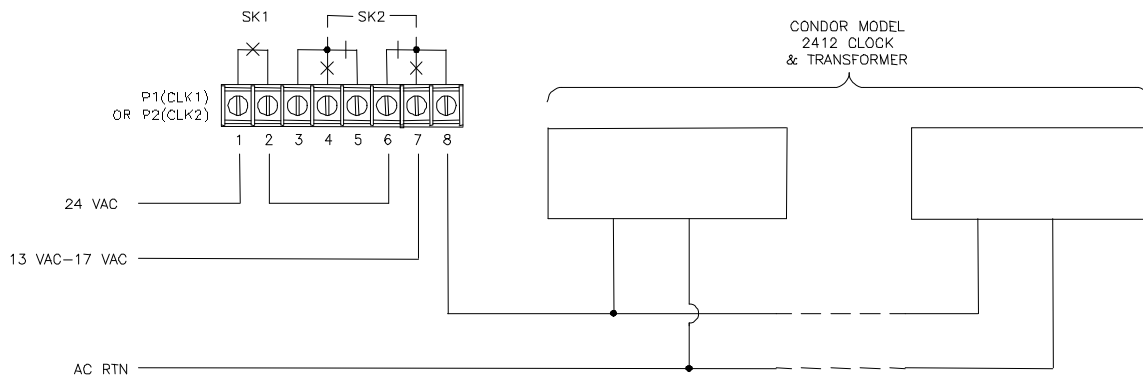


All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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.



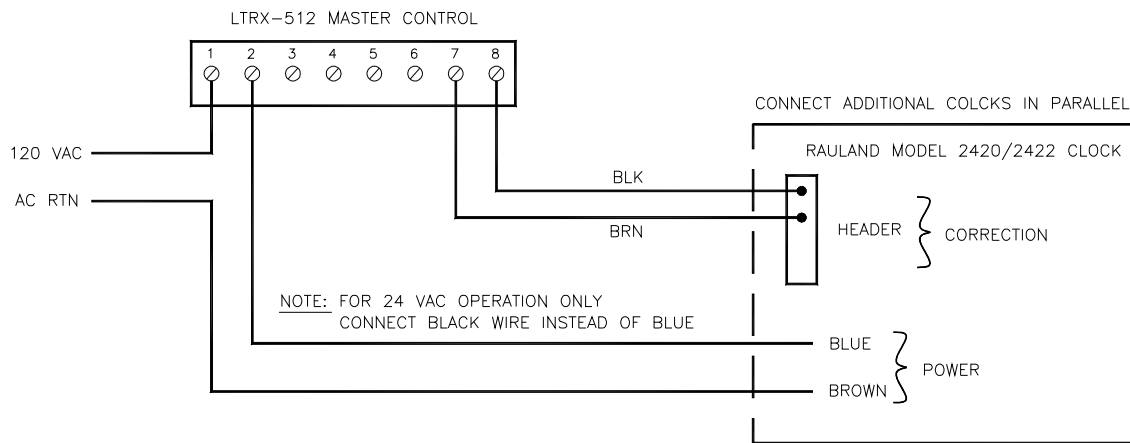
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

TYPE 23 - RAULAND 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

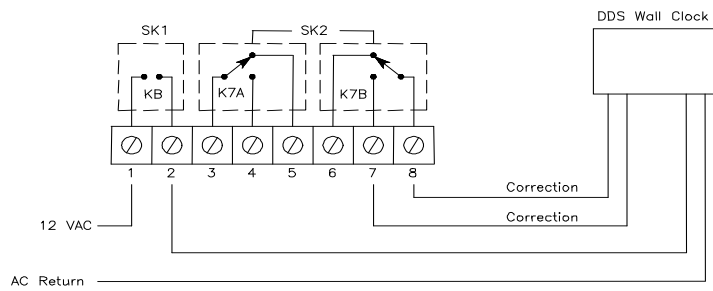
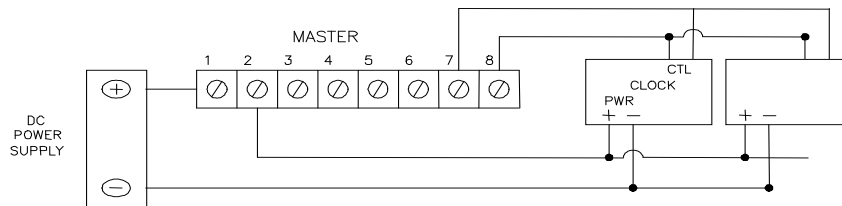


All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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.

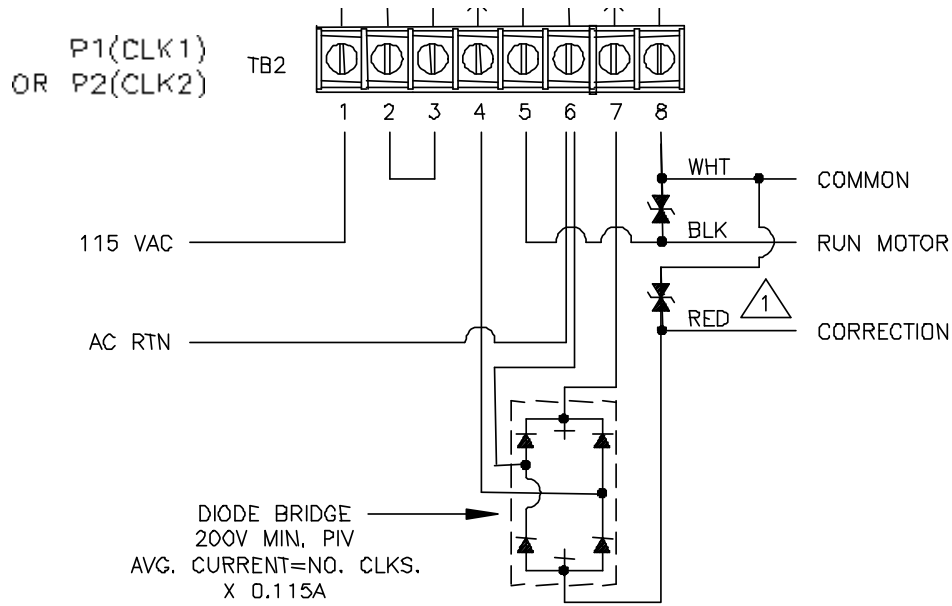
CONDOR/DIGITAL DISPLAY SYSTEM
Model # BAR-AC-4412



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

TYPE 24 - EDWARDS SYNCHRONOUS WIRED CLOCKS - TYPE E1

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

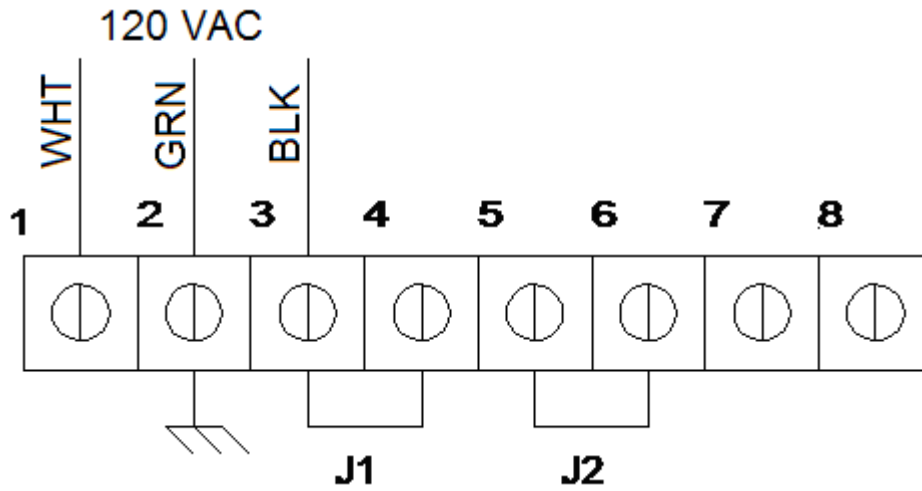


 V250LA4 MOV OR EQUIV.

APPENDIX D - WIRING DIAGRAMS: POWER, BELLS, ETC.

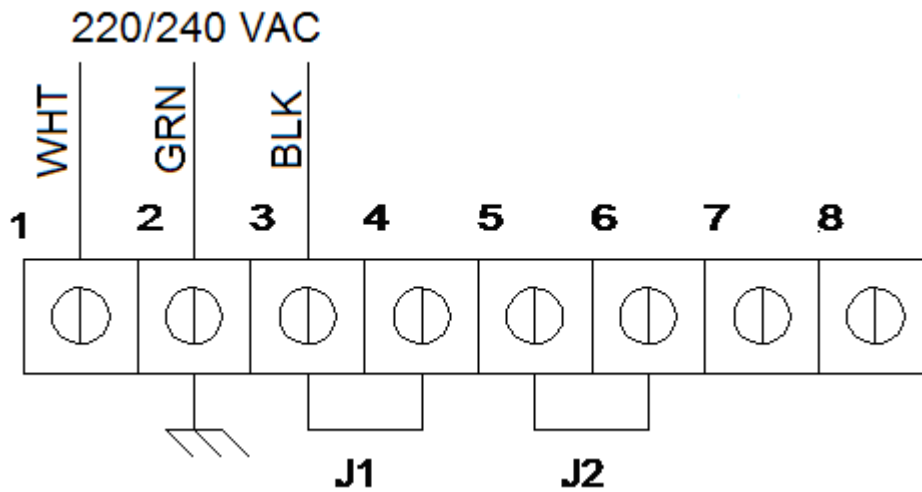
Fig. D1 - TERMINAL BLOCK 'P4'

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



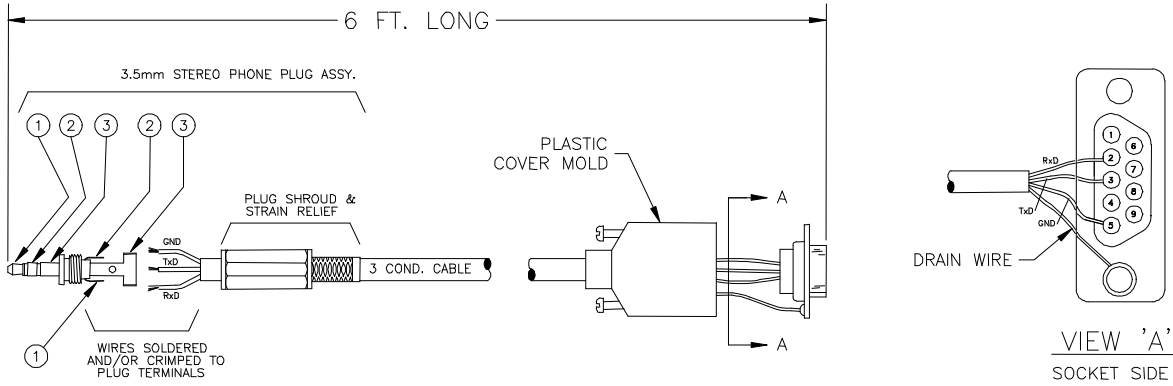
All circuits should be fused or protected by a circuit breaker (10Amp maximum)

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



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

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	METAL SHELL
	DRAIN WIRE	

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

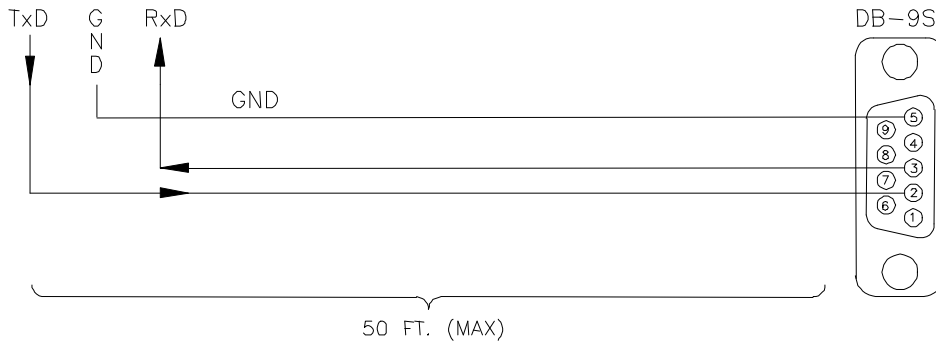
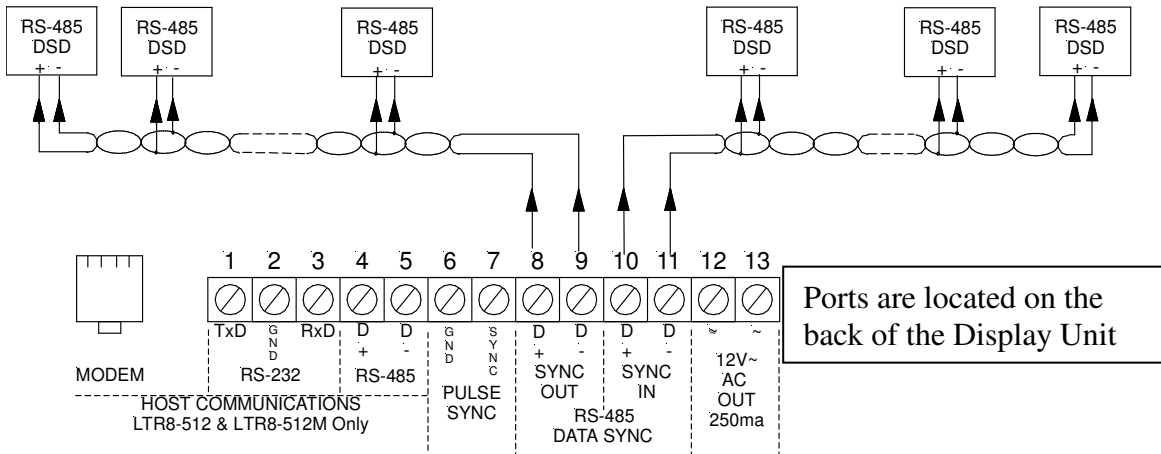
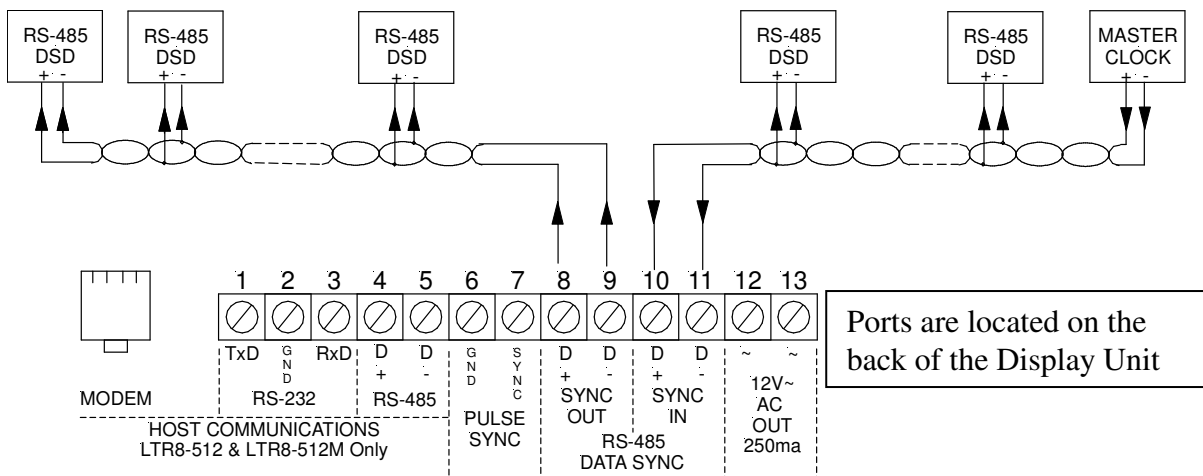


Fig. D5 - SYNCHING UP TO 60 RS-485 TIME SYNC DEVICES WITHOUT A BUFFER



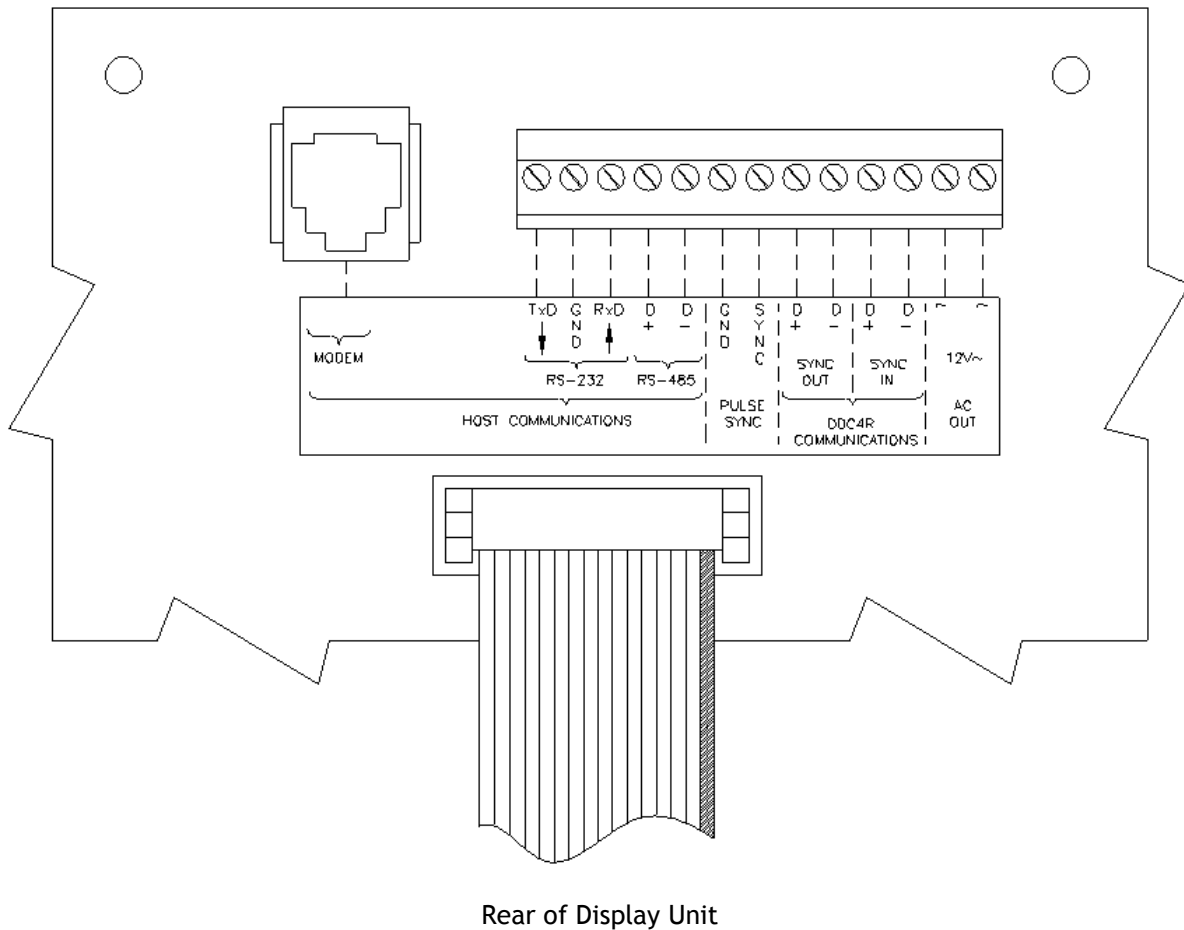
Notes: Up to 30 RS-485 Data Sync Devices (DSDs) can be connected to the Data Sync port. Since the SYNC IN port can send as well as receive, 30 extra devices can be connected. If more than 60 DSDs are to be connected, another Master Clock will have to be used as a “Booster”.

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.

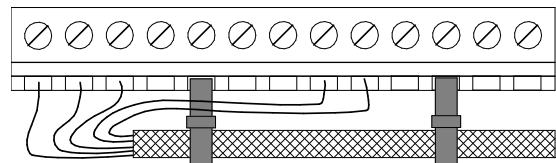
Fig. D7 - COMMUNICATION TERMINAL BLOCK

**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

Strain Relief for the Communications Cable

- 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

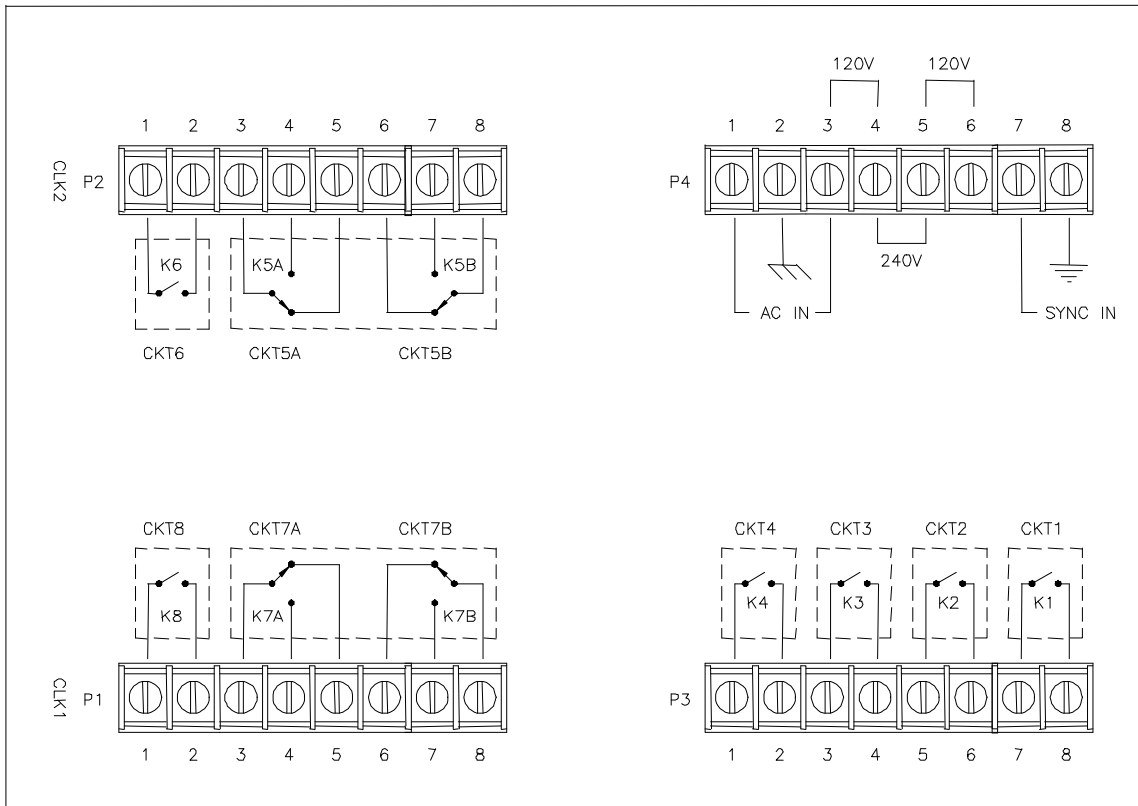
12 Volt AC Out

- A non-regulated 12 Volt 250ma power source. **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



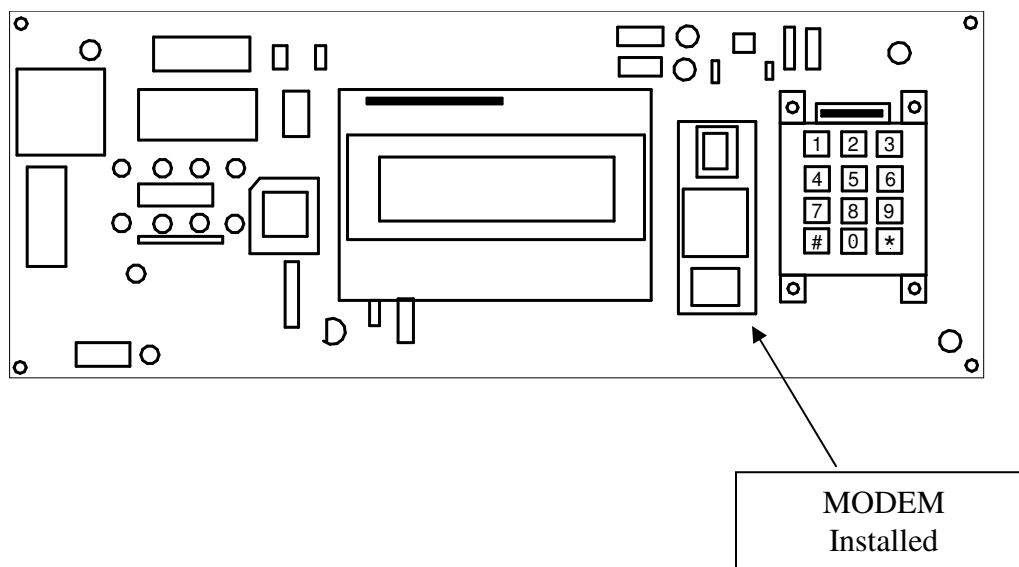
NOTES:

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 may 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.



APPENDIX F - Connecting the LTR-GPS Satellite Receiver / Synchronizer

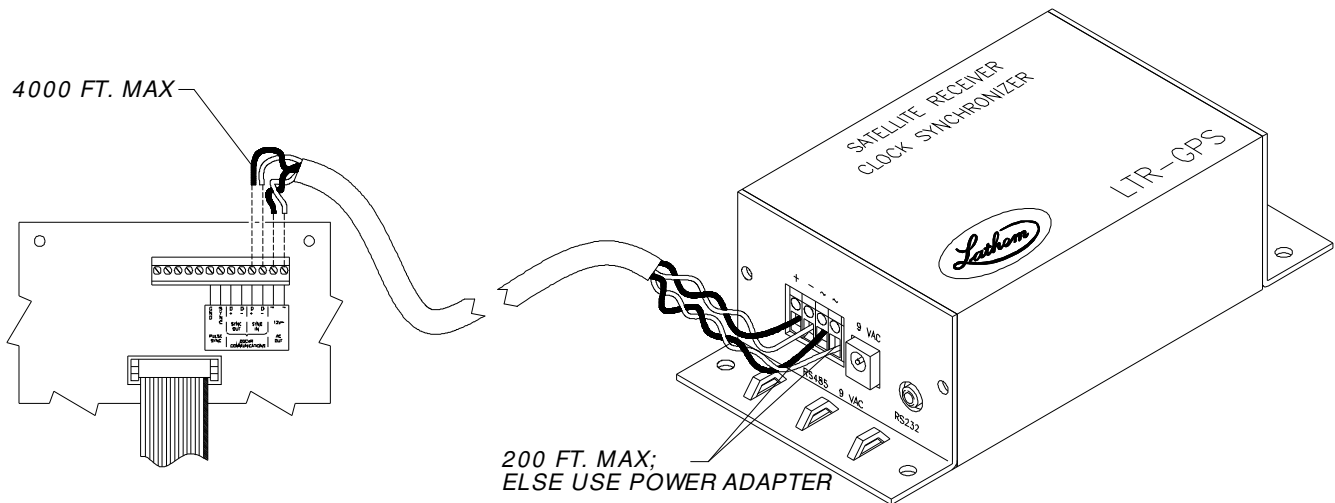
Latham's LTR-GPS is a Global Positioning Satellite receiver using 12-channels to access the accurate date and time signal transmitted each second by 24 satellites in geosynchronous orbit around the globe. The package includes an amplified GPS Antenna, which must be mounted out-doors or beneath a roof skylight, 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.

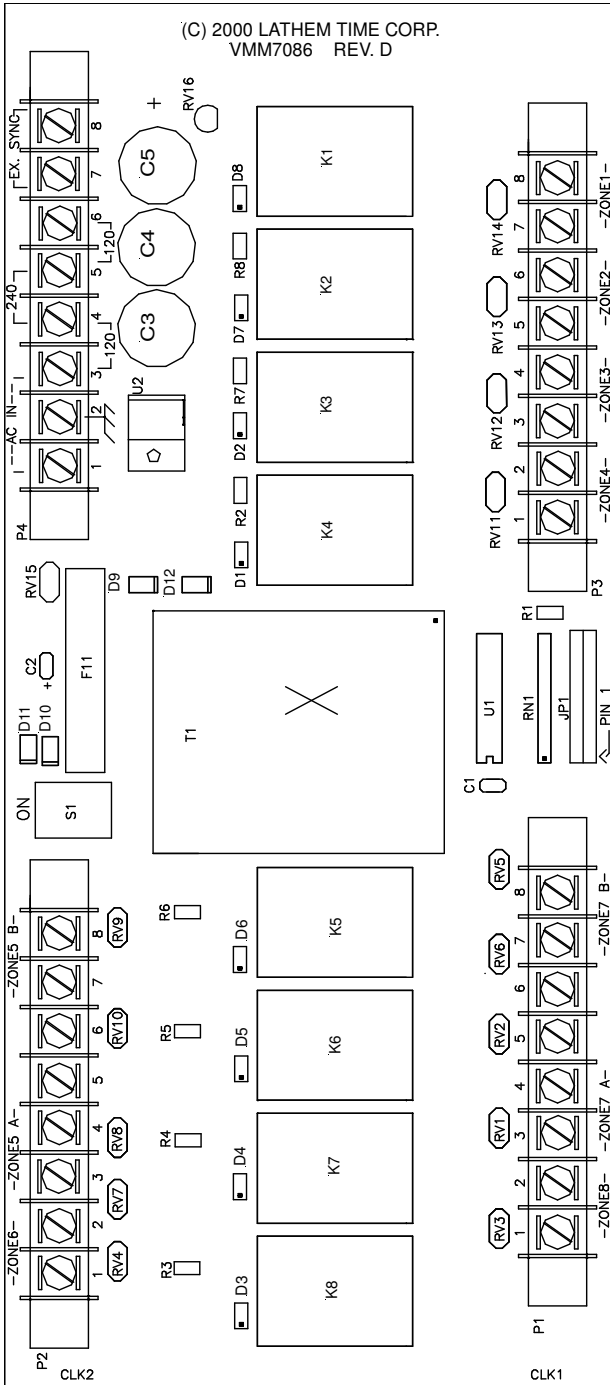
Unshielded Twisted-Pair (UTP) Cable (Cat-3 or Cat-5) is suitable to connect the D+/D- Data Output Terminals of the LTR-GPS to the D+/D- "Sync-In" Terminals on the back of the Master Clock's Front Panel Assembly.

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.

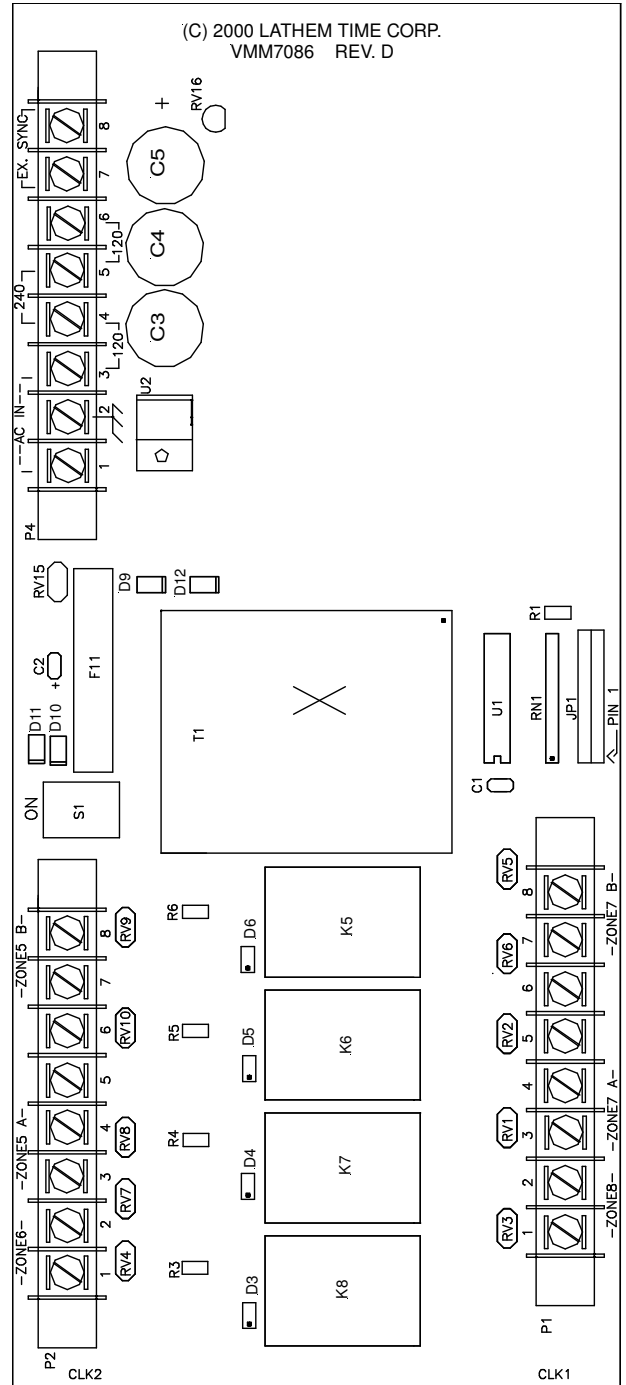


APPENDIX G - POWER SUPPLY SCHEMATICS

LTR8-512 / LTR8-512M



LTR4-512



BELL SCHEDULE PROGRAMMING CHART

SCHEDULE #: 1 2 3 4 5 6 7 8 (Circle One)

DATE: ____ - ____ - ____

REC No.	DAYS SMSTWTFSH	CIRCUITS 12345678	START HH:MM	DUR SS	REC No.	DAYS SMSTWTFSH	CIRCUITS 12345678	START HH:MM	DUR SS
Ex.	MTWTF	1234	08:00	5	Ex.	MTWTF	1234	08:00	5
01					33				
02					34				
03					35				
04					36				
05					37				
06					38				
07					39				
08					40				
09					41				
10					42				
11					43				
12					44				
13					45				
14					46				
15					47				
16					48				
17					49				
18					50				
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20					52				
21					53				
22					54				
23					55				
24					56				
25					57				
26					58				
27					59				
28					60				
29					61				
30					62				
31					63				
32					64				

COPY THIS PAGE FOR USE IN CREATING YOUR OWN BELL SCHEDULES

SCHEDULE CHANGE DATES PROGRAMMING CHART

DATE: ____ - ____ - ____

REC NO.	DATE			TIME		SCHEDULES	COMMENTS
	MM	DD	YY	HH	MM	12345678	
Ex.	06	02	10	07	00	2345	Shortened Schedule
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							

COPY THIS PAGE TO USE IN CREATING YOUR SCHEDULE CHANGE TABLE

HOLIDAYS SETUP CHART

DATE: ____ - ____ - ____

RECORD NO.	DATE			COMMENTS
	MM	DD	YY	
Ex.	07	04	10	Independence Day
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				

COPY THIS PAGE TO USE IN CREATING YOUR HOLIDAY TABLE

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
404-691-0405
www.lathem.com

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