OPERATION, INSTALLATION, AND MAINTENANCE

MANUAL

LATHEM MASTER CONTROL
MODEL LTR 8 - 128

WARNING: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case, the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

LATHEM TIME COMPANY
200 SELIG DRIVE, S.W.
ATLANTA, GEORGIA 30378

TABLE OF CONTENTS

* Only available on I Version Eproms
** Only available on UF-2C and UF-3C Version Eproms

SERIAL NUMBER _____

EPROM VERSION _____

INTRODUCTION: The LTR 8-128 Master Control is designed with the capability of operating two dissimilar secondary clock systems simultaneously with each system being any one of the types shown in this manual. The type system to be operated is selected by programming switches located inside the unit. Additionally the master is provided with three bell schedules (each schedule having 128 programmable event locations), a calendar schedule with up to 32 programmable dates for schedule changes (through year 2099), eight zones of bells, eight zones of controls, and an entry code lockout to keep unauthorized persons from changing critical entries. All user information is stored in solid state memory (static RAM) and is entered or altered via a front panel mounted keypad. The entry procedure is spelled out elsewhere in this manual. The design is centered around an eight bit CMOS micro-processor allowing the ultimate in flexibility with program instructions stored in 8K (one word=one byte) read only memory.

SCOPE: This manual will contain sufficient information to allow a reasonably trained electrician to install and maintain this equipment. The operation section of the manual is aimed at an individual who has some background in clock systems. Once the clock systems have been selected by the programming switches, operation of the clock is the same for all clock systems.

CONTROLS: Figure 1 shows the various switches and controls contained in the LTR8-128. The function of these items is as follows:

1. Battery Switch - Connects/disconnects battery power going to the internal circuitry. The power fault indicator will flash if this switch is left in the "OFF" position with the A.C. switch "ON".

2. A.C. Switch - Connects/disconnects 115/220 VAC power going to the internal circuitry. The power fault indicator will flash if this switch is left in the "OFF" position with the Battery Switch "ON".

3. Fuse 1/4 SB - Connected in series with the A.C. power going to the internal circuitry.

4. Auxiliary A.C. Power Switch - Connects/disconnects 115/220 VAC power going to TB5 (auxiliary power terminal block).

5. System 1&2 Program Switches - Provides for selecting the types of secondary clocks to be operated. The top four switches pertain to system 1 and the bottom four to system 2. Any one of 13 different type secondaries can be selected for operation. With all four switches depressed to the left for system 1 or 2, no type will be selected and the output relays for that system will be inoperative. It is recommended that both system types be selected even though no outputs may be wired to one of the systems.

6. Keypad - For entry of user information; bell schedule, control schedule, time, day date, etc.

TERMINAL BLOCKS: As shown in figure 2 there are six terminal blocks provided for connecting system clocks, bells, controls, etc. Terminal blocks are as follows:

1. TB1 (A.C. power input) - Provides for connecting 115/220 VAC power to the unit.

2. TB2 (System 1 and System 2) - Provides for connecting System 1 and System 2 secondary clocks. Terminal lug identification is etched in copper directly above the terminal block.

3. TB3 (Bells) - Provides for connecting up to eight zones of bells. Terminal lug identification is etched in copper to the left of the terminal block.

4. TB4 (Controls) - Provides for connecting up to eight zones of control circuits. Terminal lug identification is directly to the right of the terminal block.

5. TB5 (Auxiliary Power) - Provides 115/220 VAC output power which is manually controlled by the AUX AC Switch. The output can be used to furnish 115/220 VAC to the bell and control zone output relay circuits, System 1 and 2 secondary clock output relay circuits, or to an external power supply such as the Lathem PS 8-24 to generate low voltage power which may be needed to operate secondary clocks. The low voltage output of the power supply would be returned to the unit for connecting to the output relays as needed. No fuse is provided in the unit for this output. It is highly recommended that an in-line fuse be installed as needed.

6. TB6 (Serial Data) - For future provision of a serial digital data output on a 131.072KHz carrier frequency for transmission to a remote digital clock. Transmission can be over a dedicated pair of wires or on the A.C. line. If using the A.C. line for transmission then the A.C. power, feeding the master unit and the remote clocks, must be from the same transformer. This connection will provide for the future development by Lathem of a serial digital remote clock.

ELECTRICAL SPECIFICATIONS

Input Voltage	115VAC
Input Frequency	50Hz or 60HZ
Input Power	20 W maximum
Standby Power	10Ah, 6 V Gel Cell battery (Automatically recharged)
Standby Time	48 Hours
Bell Circuits	10A Form A dry relay contacts
Control Circuits	10A Form C dry relay contacts
System Clock Circuits	10A Form C dry relay contacts
Temperature Range	32° - 140° F
Voltage Range	+10%
Shipping Weight	26 pounds for LTR 8-128
	6 pounds for battery (Shipped Seperately)
Dimensions:	
Surface Mount	19" w X 13" h X 7 1/2" d
Semi-Flush Mount	19" w X 13" h X 2 1/2" d
Backbox	18" w X 12" h X 6" d

MOUNTING: The entire master clock, Lathem LTR 8-128, is designed to fit into a 12x18x6 junction box. This box may be either surface or semi-flush mounted. For flush mounting the box should protrude 3/4" from wall's surface to allow clearance for door to open. The relay/power supply card and battery are items mounted in the box. The CPU and readout cards are mounted in a front door assembly which is then mounted with the use of a piano hinge to the back box. The only connection between the front panel assembly and the relay panel is with the use of a 40 pin ribbon cable. This will allow the removal of the front panel assembly during construction of a new installation. After construction is complete and the field wires connected, the front panel may be added and turn-on completed. This will preclude any possible damage to the front panel.

NOTE: An optional trim bezel is available for semi-flush mounting.

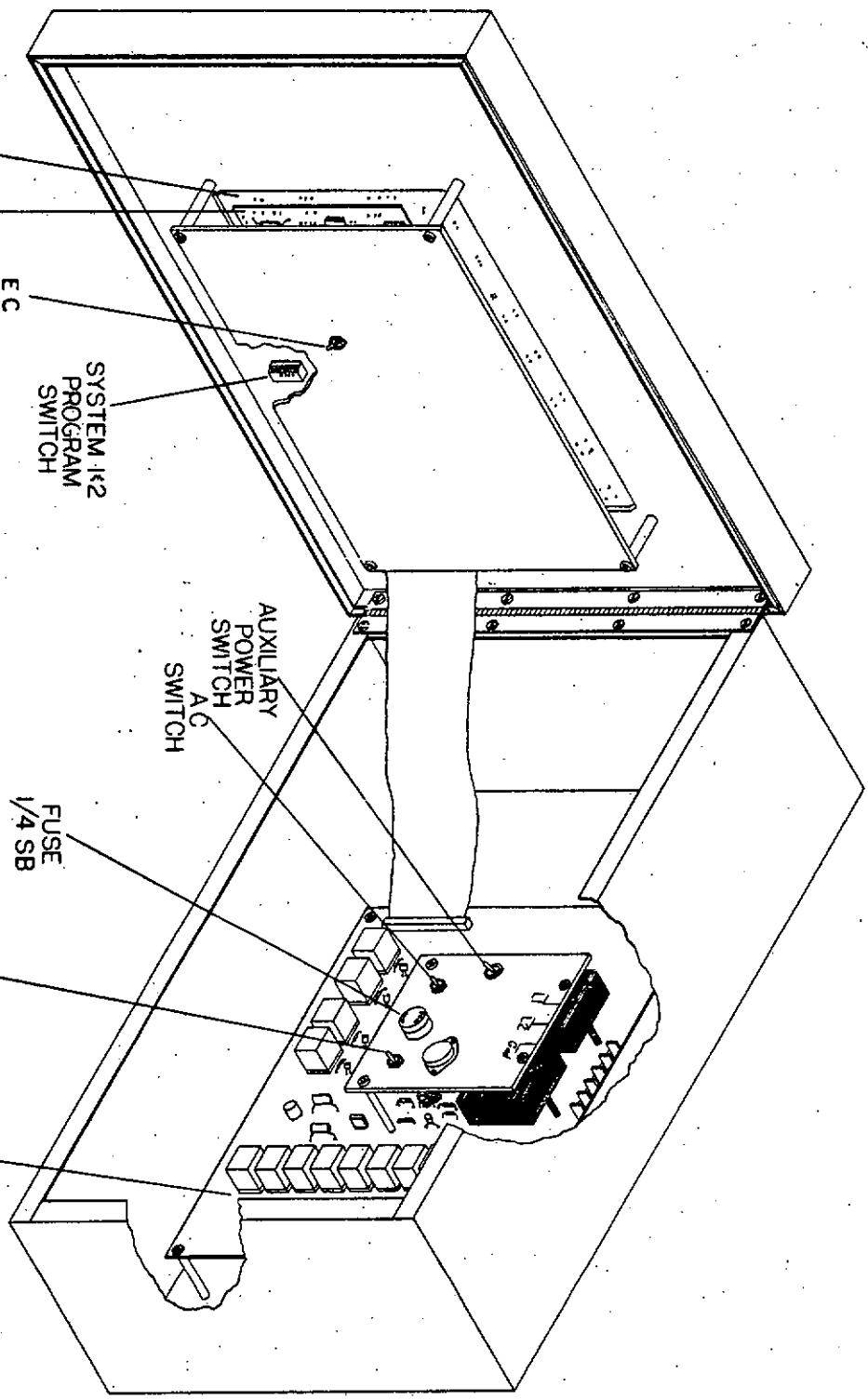

READOUT CKT. BD.
CPU CKT. BD.
E C SWITCH
SYSTEM 1<2 PROGRAM SWITCH
AUXILIARY POWER SWITCH
A C SWITCH
FUSE 1/4 SB
BATTERY SWITCH
RELAY AND POWER SUPPLY BOARD

FIG.1

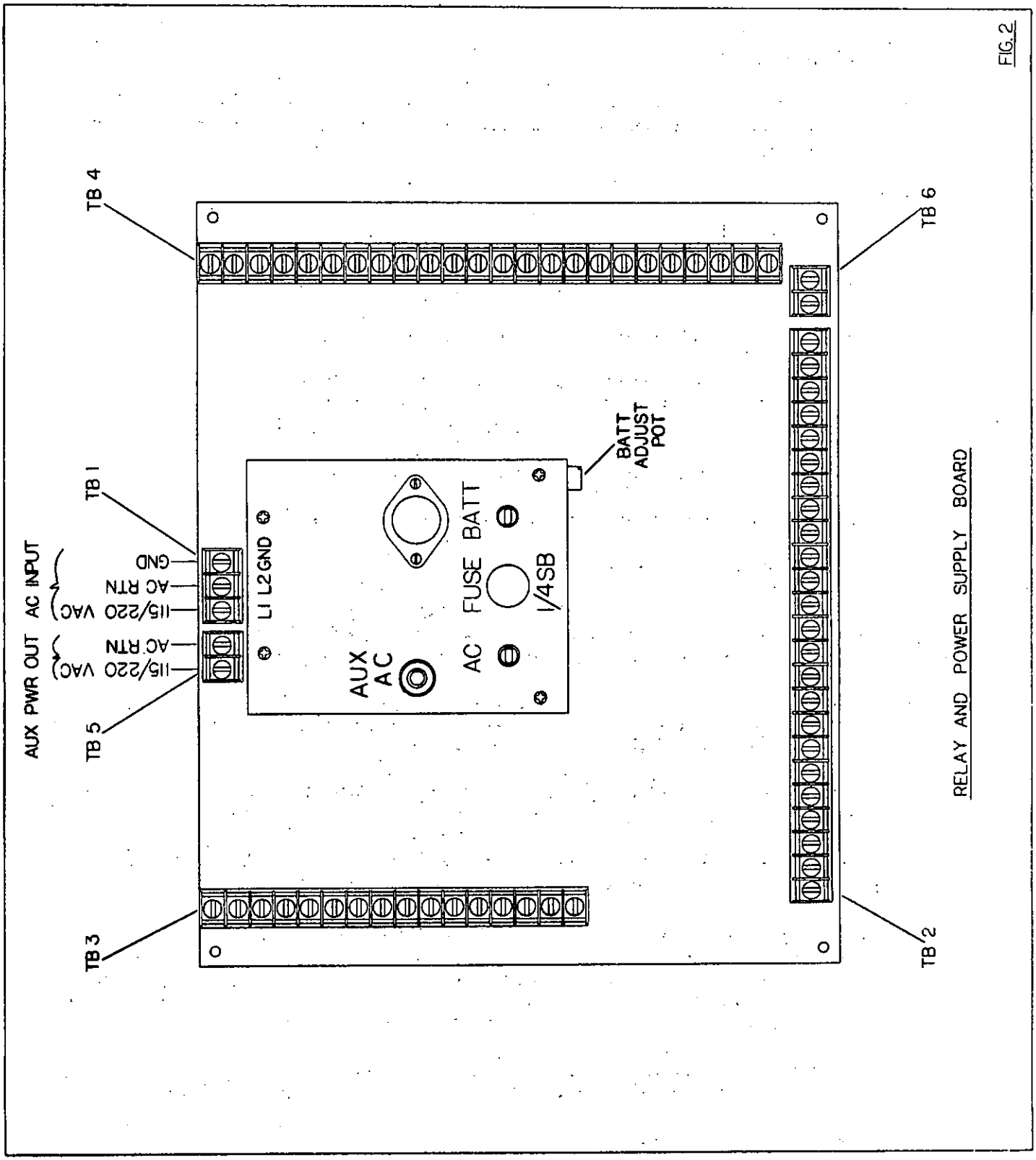

TB 4
TB 6
TB 1
TB 5
TB 3
TB 2
AUX PWR OUT AC INPUT
GND
AC RTN
115/220 VAC
AC RTN
115/220 VAC
L1 L2 GND
AUX AC
AC FUSE BATT
1/4SB
BATT ADJUST POT
RELAY AND POWER SUPPLY BOARD

FIG. 2

HOOKUP INFORMATION

The hookup for each clock system may differ. Locate the information covering the system to be operated and connect accordingly. Apply source power as needed for each type of clock system.

SEQUENCE

(1) Read theory of operation.

(2) Insure that power to unit and secondaries is turned off.

(3) Connect wires as requested to terminal blocks.

(4) Use program switches to set unit to drive the correct system
   a. Upper 4 switches are associated with system 1.
   b. Lower 4 switches are associated with system 2.

(5) Turn on power to unit and to secondaries.

(6) Set current time, day of week, date, and program as needed.

POWER UP - Setting current time, day of week, and date.

As power is applied to the unit or after a power outage, with no battery backup incorporated into the master clock, the display will show dashes on all readouts and the audible indicator will signal clock action must be taken. The key sequence is as follows:

(1) Press (0) - This is the only key active and will cause automatic advance to Set Time Mode. The display will blank with the exception of a dash on the tens of hours and zeros in the other three digits of the time display.

(2) Set Time - Refer to Set Time Mode explained on page 8 of this manual. After setting time, the unit will automatically advance to the Set Day Mode.

(3) Set Day of Week - Refer to Set Day Mode explained on page 9. After setting day of week, the unit will automatically advance to Set Date Mode.

(4) Set Date - Refer to Set Date explained on page 9 of this manual. If the E.C. switch is in the up (ON) position, after setting the date, the unit will display a cursor followed by three zeros indicating the security code must next be entered (see Entry Code instructions page 7). If the E.C. Switch were in the down (OFF) position after setting the date, then normal operation will begin.

(5) Data - Follow the procedures on pages 10 to 14 of this manual for modes 4 through mode 7 to enter the schedules and enable the controls and proper bell schedule.

MAINTENANCE AND ADJUSTMENTS

Oscillator Frequency - The clock oscillator depends on a quartz crystal to maintain the accuracy of the system. The frequency of the crystal is 2.097152 MHz. Using the frequency it is possible to say that a one Hz error in the frequency will represent an error of one second every 22 days. A test point is located on the P.C. card and the frequency of the oscillator may be measured. The accuracy of the counter used for the test will determine the overall accuracy of the clock. Adjust C3 (the trimmer capacitor located on the left corner of the CPU circuit board) to achieve the frequency of 2.097152.

Battery Voltage - The float voltage applied to the battery must be set between 6.60 to 6.85 volts. This may be measured using a digital volt meter. With AC power and battery switches on, remove the battery and measure the voltage at the battery leads coming from the regulator. Adjust the pot on the relay panel for 6.60 to 6.85 volts. NOTE: Be sure to reconnect the battery without shorting or reversing the leads.

ACCUMULATOR

During A.C. power failures the LTR 8-128 will accumulate the amount of time (hours and minutes) power is off, up to a theoretical maximum of 256 hours. Following resumption of power, the master will wait 5 to 6 minutes and then automatically start sending out hourly correction signals to all system clocks. At this time the mode 8 light will illuminate. The master will continue to issue hourly corrections until the clocks are at the top of the correct hour. Due to the nature of the accumulator one hour may be missed during advances making it necessary for one manual manual advancement via mode 8. At this point normal operation will be resumed and the mode 8 lamp will extinguish. If desired, the accumulator can be cleared and the hourly corrections aborted as follows:

(1) Press (#) - Alert the processor.
(2) Press (1) - Select the Set Time mode.
(3) Press (#) - Enter Set Time Mode.
(4) Press (*) - Return to normal display.

NOTE: The accumulator will only operate correctly if dip switches are set for both systems one and two; therefore, if only one system is selected, then set dip switches for the spare system as per 3-wire synchronous setting found on page 18.

POWER FAULT

The master clock is designed to supply battery backup during a loss in the A.C. line power. All functions with the exception of the actual clock will be curtailed during power fault. It is understood that most room clocks will not have power at this time anyway. Since the actual clock is still running during power fault, the clock will bring up the readout and room clock update automatically with the resumption of the A.C. power with the correct time. Dropping the readout during power fault will lengthen the battery backup time.

Power fault will also be entered if the battery switch is turned OFF with A.C. power still available.

As the AC power is lost and the power fault mode entered, the display will blank and "Power Fault" indicator will flash. An audible tone will also be used to alert personnel of the problem. The only key operable on the keypad is the (0). If the unit is in an entry mode, automatic abort will take place.

Pressing (0) will silence the audible indicator and turn on the local display for a period of 10 seconds. After the ten second time out, the display will again blank and another zero will be required to bring back the display. The audible tone will not be re-energized. The only indication of power fault will be a blank readout panel and a flashing "Power Fault".

ENTRY CODE

This feature is included to provide security of the operation. Only manual bells can be activated without using an entry code. The entry code feature is defeated and not used if the E.C. Switch, located on the backside of the door, is set to the down (OFF) position. This will allow anyone to alter or review data. The E.C. Switch is under the security of the cabinet lock. When the E.C. Switch is placed in the UP position, the following sequence will be true.

(1) Screen will clear showing only four zeros and an E.C. This is asking that an entry code be stored. This will be the entry code to be used by all operators from this time until the E.C. Switch is operated to the down (OFF) position.

(2) Press any keys from (0) to (9). Any sequence may be entered at this time with the last four entered being stored as the entry code.

(3) Press (#). This will cause the code to be stored and the unit will return to normal display. All operations with the keypad, with the exception of manual bells, must first be preceded by this code or the unit will not respond. An entry code of all zeros (0000) is workable, but impractical as it will be the default number (no entry) when the entry code is asked for.

(4) Entry into modes with the Security Switch ON is accomplished by the following sequence:

   (a) Press (#) - Displays four zeros and an E.C. asking for entry code.

   (b) Enter Security Code. The entered code, up to four digits, must match the stored code.

   (c) Press (#). Causes an examination of the code last entered and, if correct, transfer operation to mode selection. If the entry code does not match, the operation will return to normal display.

FUNCTIONS

Operation of the LTR 8-128 is made simple by the use of a mode menu selection. If the switch, located on the back of the door assembly, is up (ON), a security code must be entered to access the mode menu selection. In the event the security switch is up (ON), press the (#) key to obtain a display of a cursor followed by three zeros then enter the proper security code and again press the (#) key to obtain the mode menu selection. In the event the security switch is in the down (OFF) position, simply press the (#) key to obtain the mode menu selection. A total of nine mode options are displayed 1-9. Mode selection is accomplished by pressing the key corresponding to the desired mode number. Each key will override the previous key, whereas the last key pressed will display the mode selected. Actuation of the (#) key will be the termination command causing the processor to enter into the mode selected. After actuation, the mode indicator will remain lit during operation. The screen will then display the mode function. Normal operation or functioning of the master unit is not impeded while in any mode.

Escape Mode: The actuation of the abort key (*), while in any mode other than normal display, will cause the screen to return normal display. Data is generally entered with the use of the (#) key. If the abort key (*) is pressed previously to entering data with the (#) key, then no data will be altered and the screen will return to normal display.

Mode 1: SET TIME

This mode provides for setting the master unit to the current time. Only the hours, minutes, AM-PM will be altered. The seconds will not be altered from the keypad, but will reset to zero as the terminator (#) key is pressed (in Step 7 below).

The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (1) - Select Set Time Mode.

(3) Press (#) - Enter Set Time mode. The screen will display only the following at this time:

The AM-PM indicator is blanked and the cursor will appear in the 10^S hours to indicate where the first entry will appear. Hours, 10^S minutes, and minutes will all display "0" (i.e. _0:00).

(4) Enter Current Time - Entry of data (numbers) at this time will place data in the 10^S hours position. Entry of a (1) will result in a "1". Entry of any other number will result in a blank at the 10^S hour. As each successive number is entered, the cursor will move one location to the right. This will continue until all four digits have been entered. At this time the AM-PM indicators will be illuminated.

(5) Enter AM-PM - Actuation of zero (0) will enter PM, extinguishing the AM indicator. Any other numeric entry will enter an AM and extinguish the PM indicator. Failure to select AM or PM will cause the unit to assume or default to AM.

(6) If an error has been made and re-entry of the clock is desired, an actuation of any numeric key will revert to step (4) above. When the correct time is displayed continue at step 7.

(7) Press (#) - Actuation of the (#) key will cause the screen to return to normal display set with the new time. As the new time is entered with the (#) key the seconds will begin at (00).

Mode 2: SET DAY

This mode is used to enter the day of the week. This indication is made with the use of seven (7) L.E.D. lights located above the time display. Each light represents a day of the week, Sunday through Saturday.

The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (2) - Select Set Day mode.

(3) Press (#) - Enter Set Day Mode. This will light all seven (7) indicators showing the days of the week, Sunday through Saturday.

(4) Enter day - A number entry will result in one light remaining lit with the other six being extinguished. Numbers (1) through (7) will light their respective lights (days) while a selection of (8),(9) or (0) will result in all lights being lit. (The correct number - day - will have to be re-entered.) Key (1) corresponds to Sunday.

(5) Press (#) - The (#) key is the terminator causing the master to set to the selected day. The unit operation will automatically revert to normal display.

Mode 3: SET DATE

This mode will allow the setting of the date into the memory.. The order of entry is month, day, year. Only the last two digits of the year are entered. Leading zeros must be entered (i.e. 01 for January).

The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (3) - Select Set Date Mode.

(3) Press (#) - Enter Set Date Mode. The entire date display will be zeros with a cursor showing in the 10^S month position. The first data entry will be in this position.

(4) Enter Date - As each number is entered from the keyboard, the cursor will shift one place to the right. If the seventh digit is entered, the display will zero and a cursor will again display in the 10^S month position for re-entering the correct date. The entry is cyclical. Upon entering the correct date continue at step 5.

(5) Press (#) - Actuation of the terminator (#) key will set the unit to the entered date. The screen will return to normal clock display. Actuation of the abort (*) before the (#) key will destroy the displayed data and not alter the clock display.

Mode 4: BELL SCHEDULE SELECT - (Incl. programming calendar and enabling circuits)

This provides for selection of schedules A, B or C in any combination and also allows for zones to be enabled or disabled. Only enabled zones will be allowed to ring, while disabled zones will not respond to selected program schedules. Only the selected schedule(s) will automatically operate the bell zones; however, any zone can be manually operated at any time. Each schedule has a total of 128 possible entries. When these schedules are selected in multiples all bells associated with any of the selected schedules will occur. This feature allows more than 128 entries (i.e. up to 384). The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (4) - Select the Bell Schedule Select mode.

(3) Press (#) - Enter Bell Schedule Select mode. At this time four lights will be lit in the lower left of the display panel. The lights are, left to right, A-B-C-OFF.

(4) Select (1), (2), (3), (0), or (4) as described below:

Press (1) to select schedule A

Press (2) to select schedule B

Press (3) to select schedule C

NOTE: Multiple schedules can be selected. In the event that multiple schedules are selected, then all bells associated to those selected schedules will occur. If an error has been made in the selection, press key (9) to illuminate all lights A-B-C-OFF for reselection. After selecting the desired schedule(s) press (#) to activate the schedule(s) and to cause the display to return to normal display.

Press (0) to allow a selection of zones to be enabled.

Upon actuating the (0) key, while A-B-C-OFF is displayed, all eight zone lights will illuminate. Press any of the numeric keys between (1) and (8) to enable the corresponding zone number(s). Actuation of the (0) key will extinguish all zone LED's. Use the (0) key for selecting all zones to be disabled or for reselecting zones when a zone selection error occurs. After selecting the zones to be enabled press the terminator (#) key. The enabled zones will remain illuminated indicating those zones which are enabled (except when the unit is set to operate the electronic dual coded or straight frequency systems). Actuation of the (9) key, at any time during the above process, will extinguish all zone LED's and illuminate the A-B-C-OFF for reselection.

Press (4) to enter dates for automatic bell schedule and enabled zone changes.

Upon depressing the (4) key, while A-B-C-OFF is displayed, the A-B-C-OFF lights will extinguish and the first entry for a programmed schedule change will be displayed showing the date and the selected schedules or zones to be enabled. If no calendar entry has been programmed, then a cursor followed by five zeros " 0/00/00" will be displayed in the date position with A-B-C-OFF and all zone LED's extinguished. At this point there are three options available:

A. Review Calendar Schedule for Changes in Bell Schedules or Enabled Zones
B. Erase an Entry in the Calendar Schedule
C. Program Calendar for Schedule Changes or Enabled Zone Changes

A. REVIEW - Press (#) key to advance forward through the date entries or press (3) to advance backward through the date entries. Repeat pressing either key as needed.

B. ERASE - Display the date change to be erased using the (#) and (3) keys as in step A above. With this date change displayed press the (2) key. This will cause the location to be erased and the display will then show a cursor followed by five zeros "_0/00/00". Any of the three options (A,B or C on this page) can be performed at this point.

C. PROGRAM DATES - For Schedule Changes Or Enabled Zone Changes (It is not necessary to enter the dates chronological order)

1. Locate a display of "_0/00/00" following the procedures in step A.

2. Enter Date - Enter the month (01-12), day of month (01-31), and year (00-99), entering leading zeroes. If the event is to occur every year then enter (00) for the year. After completing entry of the six digits of the date A-B-C-OFF will illuminate allowing for the selection of schedules or for the enabling of zones.

   NOTE: If an error has been made entering the date, then complete the entry of all six digits of the date until the A-B-C-OFF lights illuminate, then press (#). Upon actuation of the (#) key the A-B-C-OFF lights will extinguish and a cursor followed by five zeros will again be displayed with no data being entered. Re-enter the correct date.

3. Select A-B-C-OFF - To select schedules A,B or C press (1), (2) or (3) respectively. More than one schedule can be selected simply by additional entries following the first. Press (0) if a change of enabled zones is required on the displayed date. Upon actuation of the (0) key the eight zone lights will illuminate. Select the zones to be enabled as per the instructions given on the preceding page. If a schedule selection error has been made then press (9) which will cause all A-B-C-OFF lights to illuminate for reselection.

Mode 5: CONTROLS ON/OFF

In the "OFF' mode no automatic controls will be allowed to operate. In the "ON" mode the memory is automatically searched to actuate the correct controlling relays. ON/OFF status is indicated with the use of two L.E.D.'s just to the left of the keypad.

The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (5) - Select Controls On/Off Mode.

(3) Press (#) - Enter Control On/Off Mode. Both indicators (ON and OFF) will display.

(4) Enter control On/OFF status. Press (1) to choose ON. Press (0) to choose OFF.

Pressing any other numeric key will illuminate both lights for reselection.

(5) Press (#) - Pressing the (#) key enters the selected status and returns the display to normal. If the controls are taken off automatic, the control outputs will remain in the same state, ON or OFF, prior to being taken off automatic. If no controls ON/OFF selection is made prior to termination, ON will be assumed.

Mode 6: LIST/EDIT BELLS

Any of the three bell schedules may be examined using this routing. All 128 locations may be examined or altered. From an operations standpoint this is the most complex procedure. The following will be used to walk the operator through. Bell schedule entries need not be in chronological order.

The key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (6) - Select List/Edit Bells Mode.

(3) Press (#) - Enter List/Edit Bells Mode. The entire screen will be blank except for the list/edit mode light and four schedule indicators, A-B-C-OFF.

(4) Schedule select. The next entry will determine which schedule is to be listed or edited.

The data entry is as follows:

Press (1) to choose schedule A

Press (2) to choose schedule B

Press (3) to choose schedule C

Any other numeric entry will cause all four lights, A-B-C-OFF, to illuminate waiting for a schedule select. As schedules are selected the operation of the system has not been altered while in mode 6. If a schedule selection is not made prior to step 5, the system will abort the list/edit bells mode and return to normal display.

(5) Press (#) - Enters into schedule selected in step 4. The data stored at location (001) in the schedule will be displayed. This will show the time, AM-PM, days of the week, and in which zones the bells should ring. The calendar display will be blank except for the right three digits which will display the three digit location 000-128. If this is an empty location (no previous entry), the location counter will display location (001) and the time will have a cursor followed by three zeros (i.e._0:00).

(6) Six options are available at this time (Steps I. through VI. below).

I. Rapid Advance Of The Location Counter.

Pressing (#) will increment the location counter. It will increase each time the (#) key is pressed until location 128 is reached. Actuation of the (#) key while the 128TH location is displayed will cause the unit to abort the List/Edit Bell Mode and return to normal display. If at a location less than 128 after the key (#) is held down for longer than one second, automatic rapid advance is initiated. The rate is approximately one step/second.

II. Rapid Retard Of The Location Counter

Press (3) - A (3) key actuation will have the same effect as step I. above, but the location counter will decrement.

III. Data Entry

1. Before a new time can be entered the screen must display a cursor followed by three zeros and the first entry must be a zero or a one. The four digit clock must be entered to completion (all four digits). Even though the 10^S hours will not display a leading zero, it must be entered. After all four digits are entered, the AM-PM lights will illuminate.

2. AM-PM Select. Press (0) to choose PM. Any other numeric key will select AM, as it is also the default indicator. If no AM-PM selection is made prior to step 3, AM will be assumed.

3. Press (#) - A terminator (#) key will display all seven day indicators.

4. Day Select - Any key from (1) to (7) will deselect its respective day for bell actuation. Press (9) to recall all lights for reselection. If all days actuation is desired, press (9) before continuing at step 5.

5. Press (#) - Operation will move to zone select with all eight zone indicators being illuminated. If a selection was not made in step 4, actuation of the (#) key will index to the next entry location while not storing any data entered in steps (1) through (4) above in memory.

6. Data - Entry is identical to the day select above. Any numeric key between (1) to (8) will deselect its respective zone. Depressing (0) will recall all zone lights. After the correct zones are entered, proceed to step 7. If all zones are desired, press (9) before proceding to step 7.

7. Press (#) - All data previously entered in steps 1 through 6 above will be stored. At this time the counter will increment to the next location. The process may be repeated from step 1 above. If a selection was not made in step 6, actuating the (#) key will index to the next entry location without storing any of the data entered in steps 1 through 6.

8. Exit from List/Edit Mode may be made by pressing the abort key (*) or forward advancing from location 128.

IV. Delete and Re-enter

If (1) is pressed with the display showing data, the data will be cleared and the location counter will not change. If this entry is used with a cursor and three zeros showing, data entry will commence and operation will revert to 6-III-1.

V. Delete and Increment Position Counter.

Pressing (2) will clear the display and increment the position counter. If this entry is used with a cursor and three zeros showing, data entry will commence and operation will revert to 6-III-1.

VI. Clear Entire Schedule

Pressing the (4) will cause the time display to show four bars. This is a warning. Actuation of the (#) key will cause all 128 locations in this bell schedule to be cleared. Exit before actual clear can be accomplished by pressing the abort key (*).

Mode 7: LIST/EDIT CONTROLS

Loading and operation is similar to the previous section, List/Edit Bells, with the exception of selecting rather than deselecting zones and entering "ON" or "OFF" designator after zone entry. This format is spelled out by pre-empting during the entry sequence and is self explanatory.

(1) Press (1) to choose ON

(2) Press (0) to choose OFF

Any other entry will result in a return to zone entry and the above will be repeated. Only one zone may be selected for a given entry. If an ON/OFF selection for an entry is not made the "ON" will be assumed. Entries need not be in chronological order. However, if two entries for a zone specify the same time but one specifies "OFF" and the other "ON", then the latter entry will be the controlling entry.

Mode 8: ADVANCE CLOCKS

As stated previously the LTR 8-128 is capable of operating two dissimilar clock systems (1 and 2) simultaneously. The advance clock operation will advance all clocks of either or both systems to the next hourly correction position. The only known exception to the above is the minute impulse type manufactured by Tritech.

The following key sequence is executed:

(1) Press (#) - Alert the processor.

(2) Press (8) - Select Advance Clock Mode.

(3) Press (#) - Enter into Advance Clock Mode. The time display will show 1 2 indicating the operator is to select system 1 or 2 or both for advance.

(4) Select System. The next entry will determine which system (1 or 2) will be advanced. Press (1) to choose system 1 clocks. Press (2) to choose system 2 clocks. Any other numeric key or no selection will select both systems.

(5) Press (#) - The unit will revert to normal display and the mode 8 light will be illuminated indicating that system clock advancement is in process. The mode 8 light will extinguish when the advancement is complete. If the DIP switches for the system selected for advancement are not set to operate system clocks at the time the terminator (#) key is depressed, the advancement routine will be aborted automatically.

(6) Abort System Advance Mode - If desired, a system advancement in process can be aborted as follows:

Press (#) - Alert the processor

Press (1) - Select the Set Time Mode

Press (#) - Enter Set Time Mode

Press (*) - Return to normal display

The mode 8 light will be extinguished

Mode 9: MANUAL CONTROLS

This mode allows altering the ON/OFF status of the control zones. These may be activated or deactivated. Each entry will alter only one specified zone of control.

Key sequence is as follows:

(1) Press (#) - Alert the processor.

(2) Press (9) - Select Manual Control Mode.

(3) Press (#) - Enter Manual Control Mode. The zones in the "ON" state will all be listed at this time.

(4) Press any key from (1) to (8) corresponding to the control zone to be altered.

(5) Select ON/OFF - Press any numeric key (0) to (9). Any key other than zero (0) will result in an "ON" condition. Pressing zero will cause an "OFF" condition.

(6) Press (#) - Sets selected control zone ON/OFF state and returns to step 4 above. Repeat steps 4 through 6 as needed.

To return to normal display, depress (*) key.

(*) MANUAL BELLS

The following instructions describes how to manually ring the bells in one or more zones for a duration of five seconds. To enter this mode, normal time and date must be displayed.

The key sequence is as follows:

(1) Press (*) - Display will illuminate the eight bell circuit LED's.

(2) Select bell zones - Select zones for bells to ring by pressing the number key(s) corresponding to the desired zone(s). Depressing the (9) key will recall all zones for reselection.

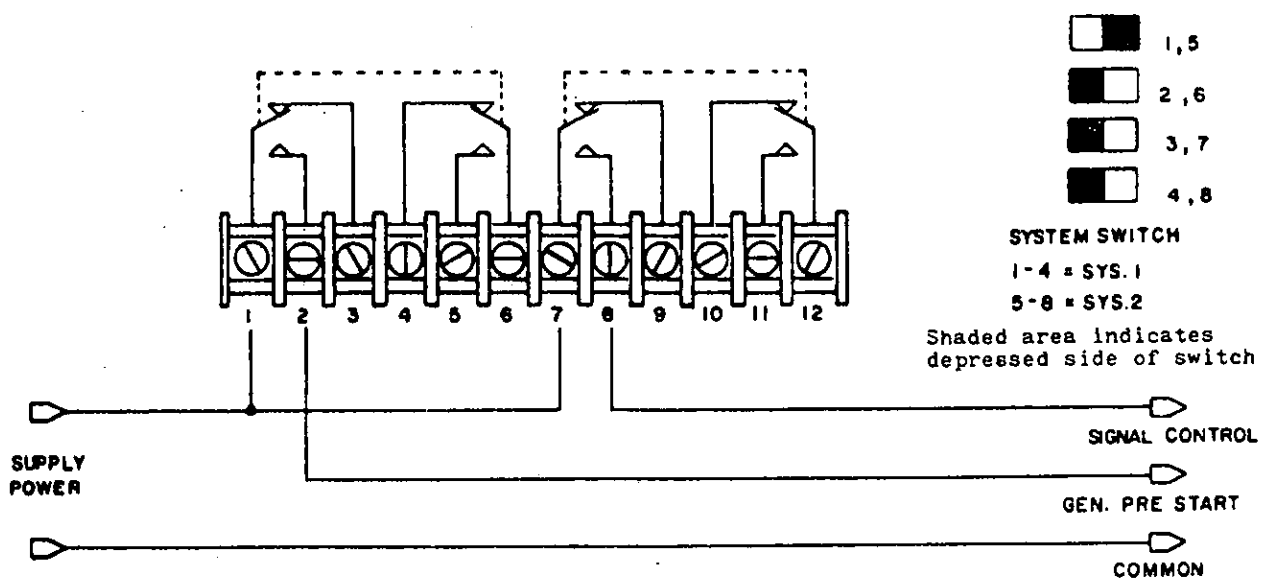
(3) Press (#) - Activates all selected zones for five seconds.

Any time a zone is activated an internal audible devie will alert along with the activated zones "blinking" on and off. This is true during manual or automatic operation.

ELECTRONIC CODED: Application of 120VAC will cause clocks to operate normally. Closing of the bell relays will cause encoding of the bells to each zone. Zone 8 can be used in conjunction with zones 1 through 6 to specify whether the zones are to be ON or OFF. zones will automatically abort if programmed to occur or manually occur during the clock corrections to prevent conflict with correction signals. Durations for zones 1 through 6 are 3 seconds and for zones 7 and 8 are 4 seconds. Zone 8 can be used as ON/OFF control in dual coded systems.

NOTE: When operating electronic coded secondaries the enabled zone LEDs will not be illuminated during normal operation.

TIMING		FROM	TO
Generator Prestart	Bells	X':0"	X':59"
	Hourly Corr.	X:57':00"	X:58':02"
	12 Hr. Corr.	5:57':00"	5:58':08"
Control Signal	Bells	X':10"	X':13"
	Hourly Corr.	X:57':10"	X:57':13"
		X:57':54"	X:58':02"
	12 Hr. Corr.	5:57':10"	5:57':13"
		5:57':54"	5:58':08"
Bell/Control Signal	Zone 1	X':45"	X':48"
	Zone 2	X':40"	X':43"
	Zone 3	X':35"	X':38"
	Zone 4	X':30"	X':33"
	Zone 5	X':25"	X':28"
	Zone 6	X':20"	X':23"
	Zone 7	X':50"	X':54"
	Zone 8	X':55"	X':59"



STRAIGHT FREQUENCY

The 3510 Hz frequency is used for clock correction. Frequencies 4200, 5010 and 6000 Hz are used for bell control and will be switched with the use of bell output relays.

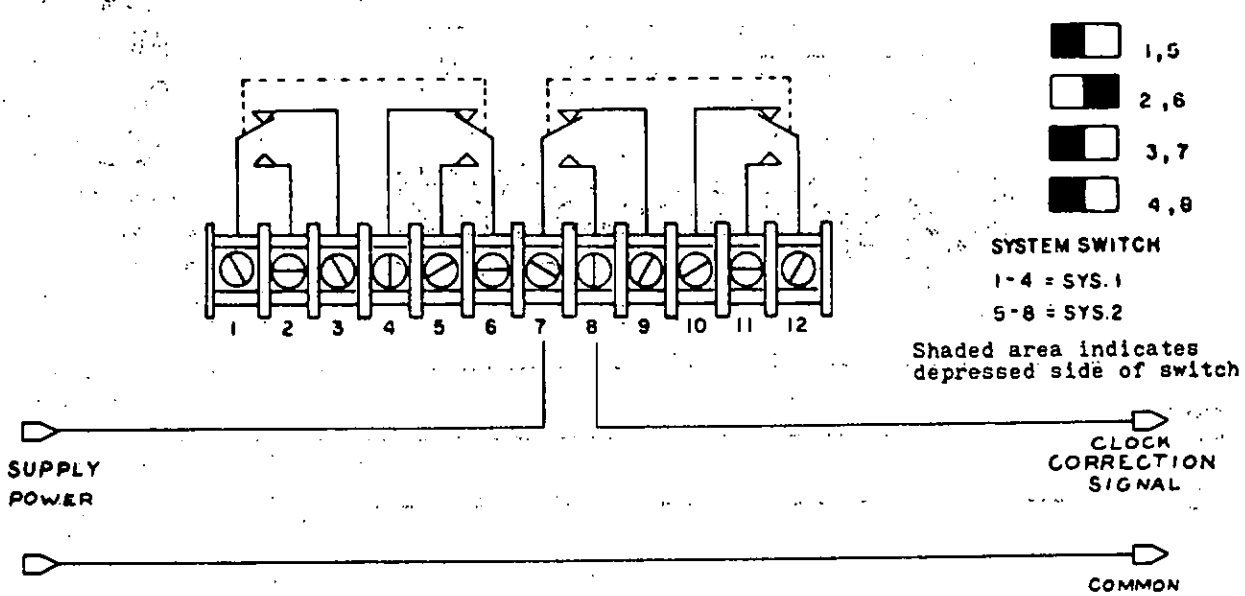
The application of 3510 Hz for a period of eight seconds will cause an hourly correction to the 59th minute. Twelve hour correction is achieved by pulsing 3510 Hz for eight seconds for an output of fourteen seconds total. This will cause all clocks to advance to 5:59 o'clock. Manual or programmed bells to occur during clock correction will automatically be disabled as not to interfere with the correction signal.

NOTE: When operating straight frequency secondaries the enabled zone LEDs will not be illuminated during normal operation.

TIMING SEQUENCE		FROM	TO
CORRECTION SIGNAL	Hourly Corr.	X:57':54"	X:58':02"
	12 Hr. Corr.	5:57':54"	5:58':08"
BELLS	Zones 1,7,8	X:Y':00"	X:Y':05"
	Zone 2	X:Y':05"	X:Y':10"
	Zone 3	X:Y':10"	X:Y':15"
	Zone 4	X:Y':15"	X:Y':20"
	Zone 5	X:Y':20"	X:Y':25"
	Zone 6	X:Y':25"	X:Y':30"

Type of secondary clocks covered under this type are as follws:

IBM Series 76
Simplex Series 76

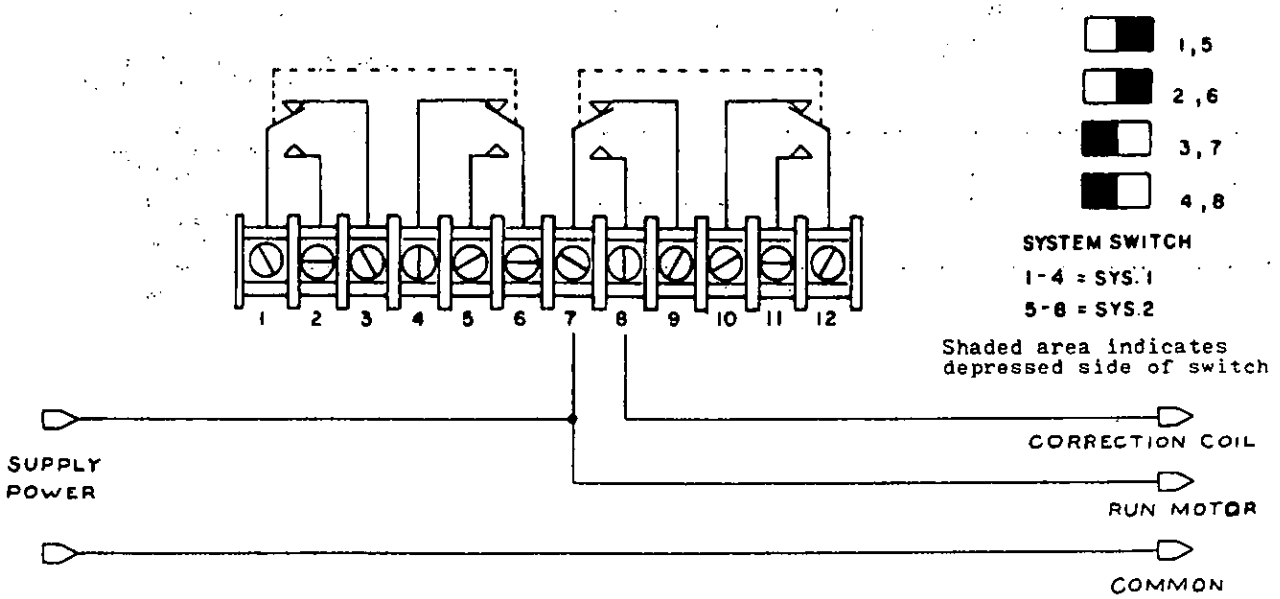


SYNCHRONOUS WIRED

120VAC/24VAC is used to operate the clocks normally. Applying an eight second command signal on the corrective line from 57 minutes, 54 seconds to 58 minutes, 02 seconds will cause an hourly correction. Application of a command on the corrective line from 5:58:02 through 5:58:08 in addition to the hourly corrective will result in a twelve hour correction.

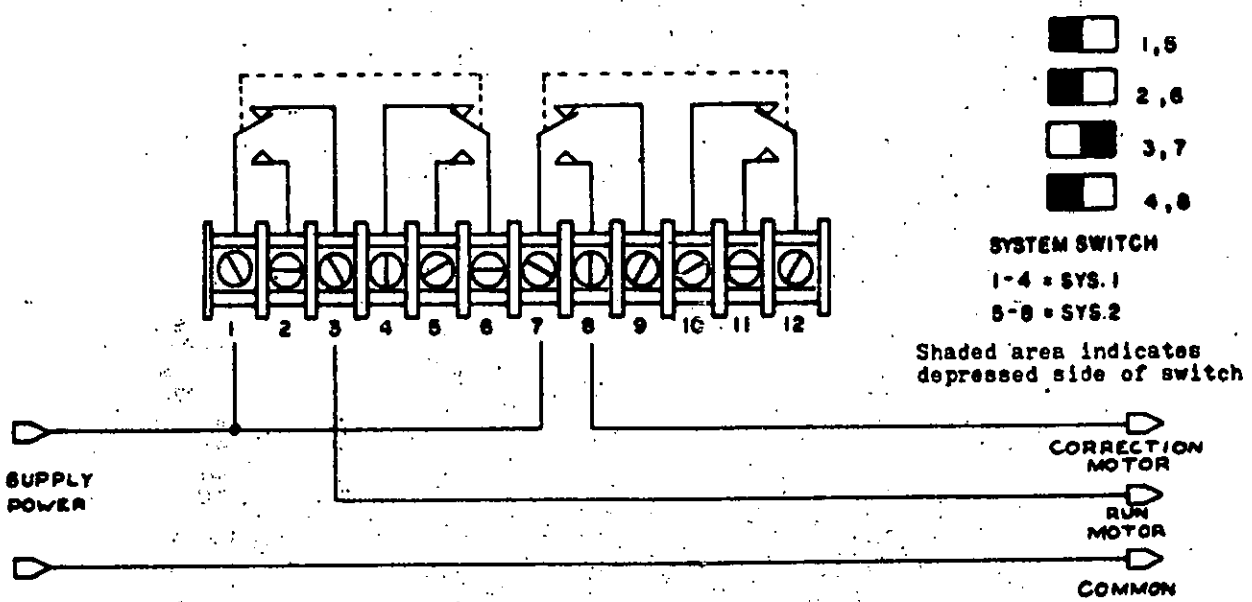
Types of secondary clocks covered under this type are as follows:

Cincinnati	D10
IBM	77 Series
Simplex	77 Series, 93-9, 91-9, 941-9, 943-9
Stromberg	3000
Lathem	Type SS Wall Clocks
Edwards	Model 2440



STANDARD ELECTRIC TIME 3-WIRE SYNCHRONOUS

120 VAC/24VAC applied to the run motor will cause normal operation. A 15 minute correction signal on the correction motor line will cause a 12 hour correction from 5:15:00 to 5:30:00. This will occur twice daily (AM and PM). Run motor power is connected during the 12 hour correction. A 29 Second signal is applied to the correction motor line from XX:59:30 to XX:59:59 to cause hourly corrections. During hourly corrections, power is disconnected from the run motor line.

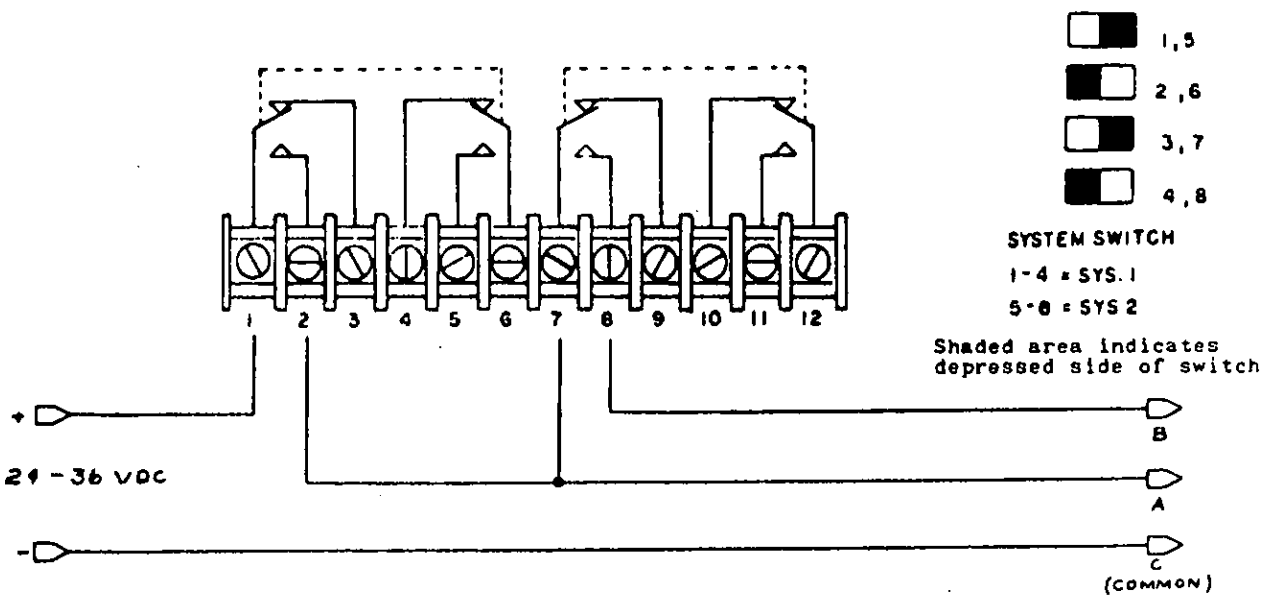


THREE WIRE MINUTE IMPULSE (59 MIN.)

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 59th minute through the 49th minute the pulse is tramsmitted on both the A and B lines. From the 50th minute to the 59th minute the pulse is tramsmitted on the A line only. Clocks which are fast and reach the 59th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted on the B line. During the 59th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted at a 0.5 Hz rate on the A line to advance all slow clocks.

Types of secondary clocks covered under this type are as follows:

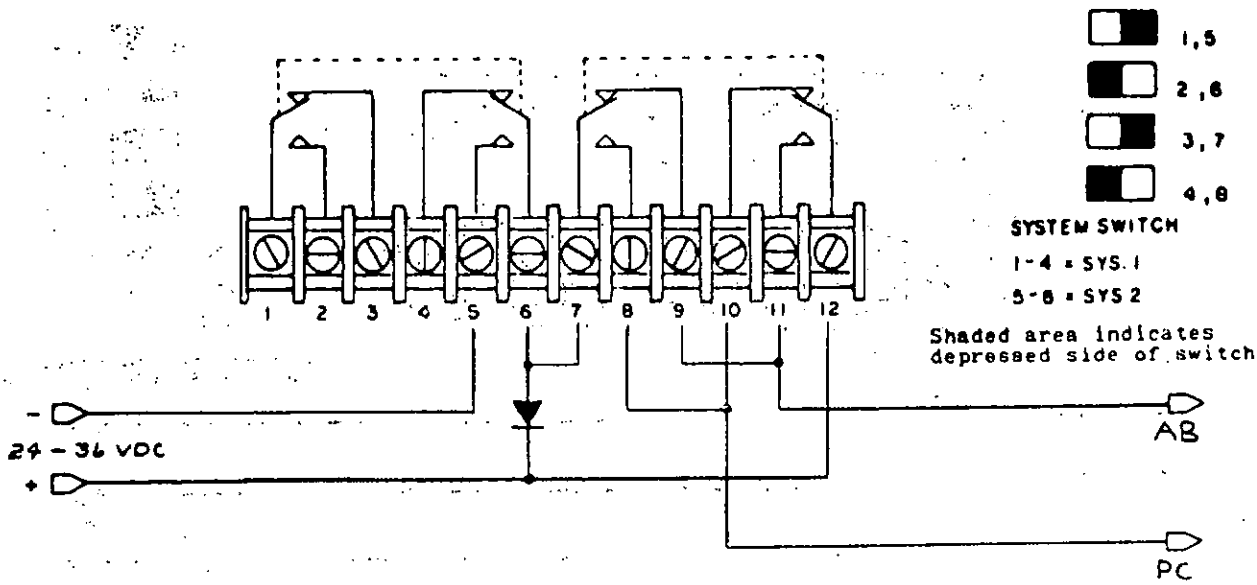
Lathem	Type ISC Recorders (3-Wire)
Cincinnati	D2
Edwards Impulse	
Faraday Impulse	
IBM	75 Series
Simplex	75 Series, 91-4, 93-4, 941-4, 943-4
Standard Impulse	
Stromberg Impulse	



TWO WIRE MINUTE IMPULSE REVERSE POLARITY (59TH MIN)

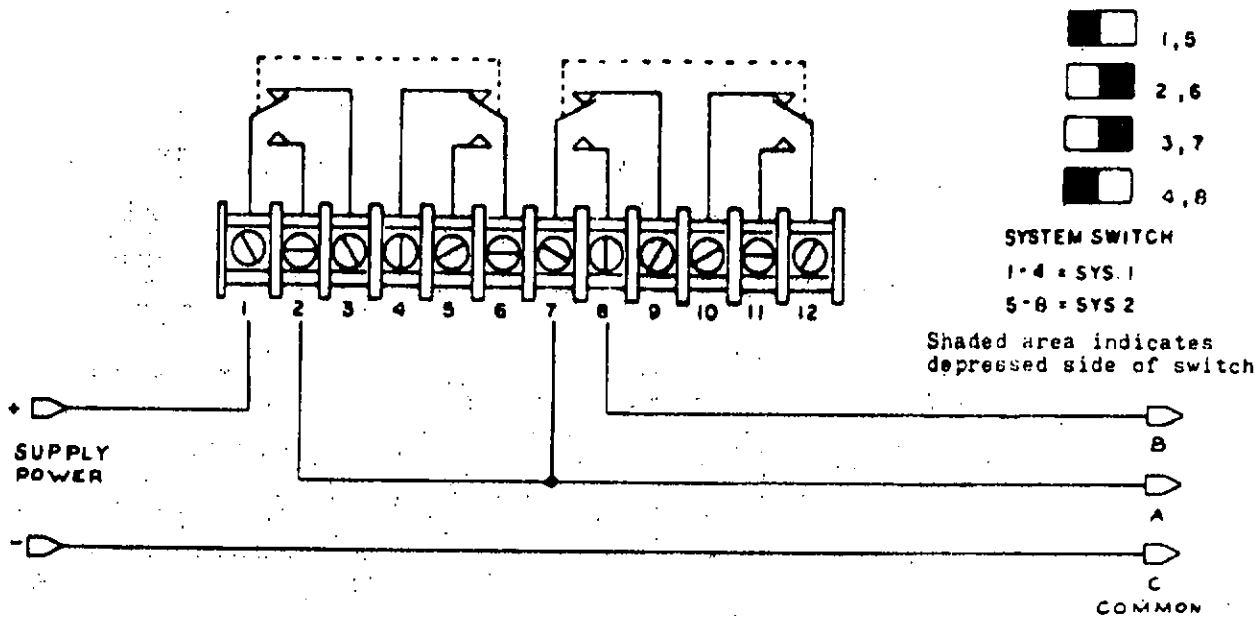
From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 59th minute through the 49th minute the pulse is tramsmitted with line AB positive with respect PC. From the 50th minute to the 59th minute the pulse is tramsmitted with line AB negative with respect to PC. Clocks which are fast and reach the 59th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted with line AB positive with respect to PC. During the 59th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted at a 0.5 Hz rate to advance all slow clocks. During the rapid pulsing line AB is negative with respect to PC. Use a diode connected as shown below for arc suppression of the relay contacts.

Lathem	Type ISC Recorders (2-Wire)
Cincinnati Models	D3



THREE WIRE MINUTE IMPULSE (58TH MIN.)

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 58th minute through the 48th minute the pulse is tramsmitted on both the A and B lines. From the 49th minute to the 58th minute the pulse is tramsmitted on the A line only. Clocks which are fast and reach the 58th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted on the B line. During the 58th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted at a 0,5 Hz rate on the A line to advance all slow clocks.

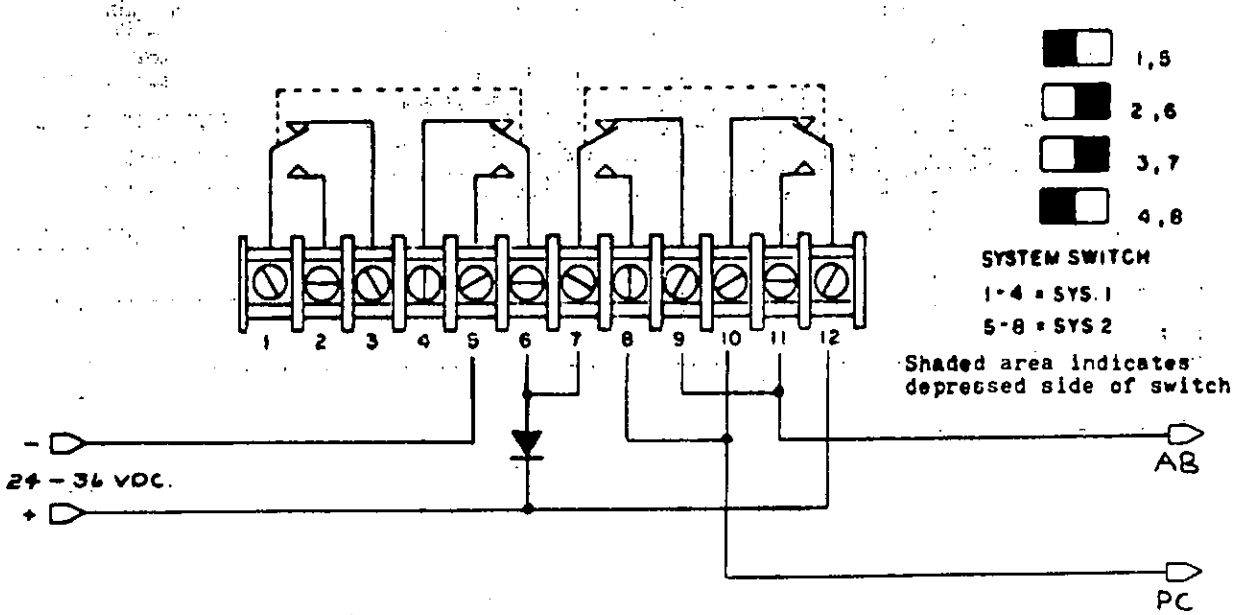


TWO WIRE REVERSE POLARITY MINUTE IMPULSE (58TH MIN)

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 58th minute through the 48th minute the pulse is tramsmitted with line AB positive with respect to line PC. From the 49th minute to the 58th minute the pulse is tramsmitted with line AB negative with respect to PC. Clocks which are fast and reach the 58th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted with line AB positive with respect to line PC. During the 58th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted at a 0.5 Hz rate to advance all slow clocks. During the rapid pulsing line AB is negative with respect to line PC. Use a diode connected as shown below for arc suppression of the relay contacts.

Types of secondary clocks covered under this type are as follows:

Stromberg

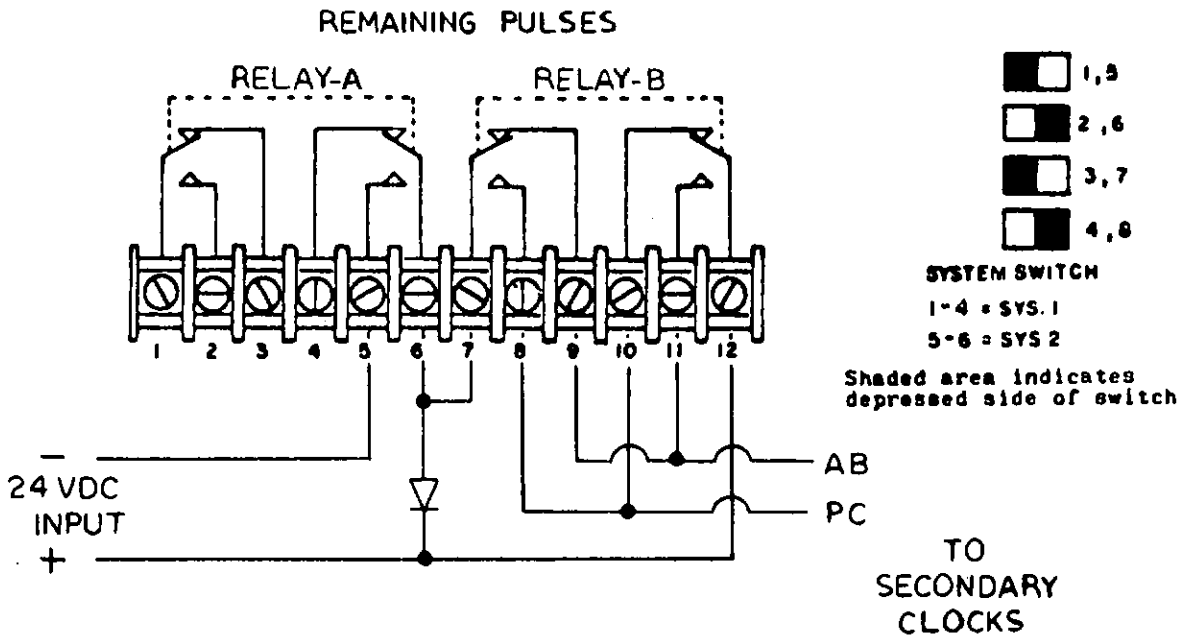


TWO WIRE MINUTE IMPULSE REVERSE POLARITY (44TH MIN)
Available only on UF-2C and UF-3C Version EPROMS

Each minute from the 58th second to zero second, relay A is operated to output a pulse to secondary clocks. Pulse polarity is determined by relay B. From 50'58" to 44'58" relay B is not operated, causing line PC to be positive with respect to line AB. During the 44th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted at a 0.5Hz rate and line PC is positive with respect to line AB in order to advance all slow clocks. From 44'58" to 50'58" relay B is operated causing line PC to be negative with respect to line AB. During manual clock advance a total of 60 pulses are generated at a rate of 1 each 2 seconds. Line PC will be negative for the first 5 pulses and the be positive for the remaining 55 pulses.

Types of secondary clocks covered under this type are as follows:

Simplex

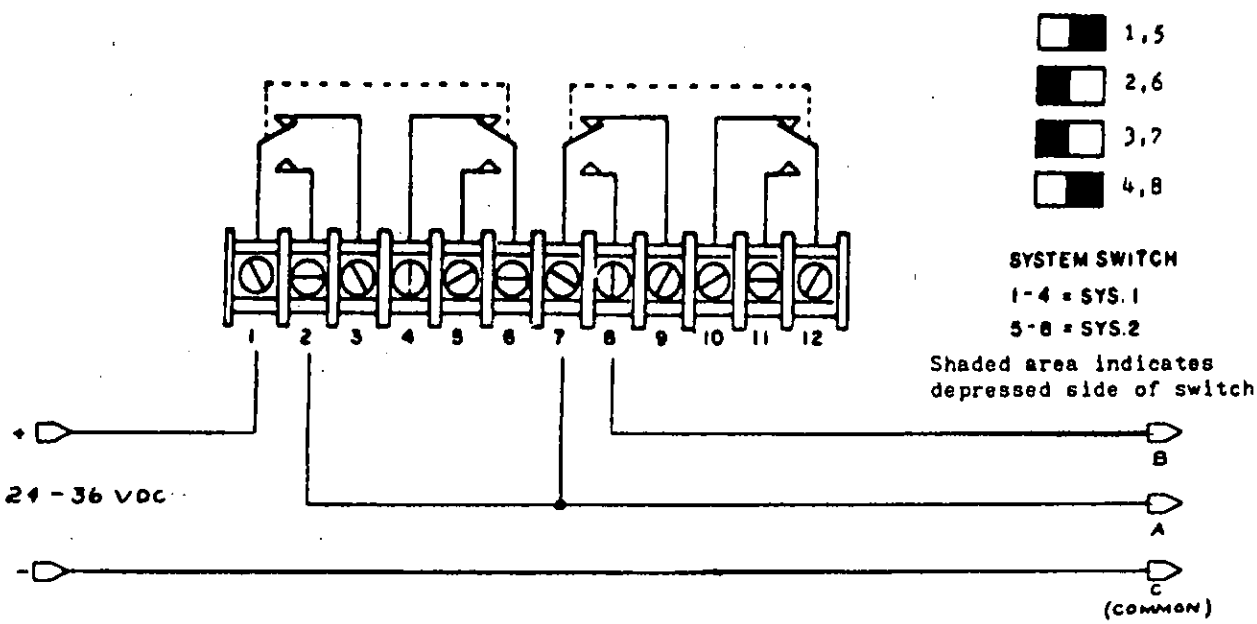


THREE WIRE MINUTE IMPULSE (59TH MIN.) WITH 12 HOUR CORRECTION

Each hour from the 59th minute through the 49th minute a two second pulse starting at the 58th second and ending at 00 seconds will be transmitted on both the A and B lines causing all clocks to advance each minute. From the 50th minute to the 59th minute, transmission will be on the A line only. Clocks which are less than ten minutes fast will stop at the 59th minute since they transfer to the B line at this time. Each hour starting at the 59th minute and 10 seconds a total of twenty rapid pulses occuring at a rate of 0.5 Hz will be transmitted on the A line. Clocks which are slow will be advanced at this pace. Each twelve hour period from 6:02 through 6:44 twenty-three rapid pulses will be transmitted each minute on the A line, with transmission starting at 10 seconds after and ending at 55 seconds after. Clocks which are more than one hour slow will be rapidly advanced toward correct time.

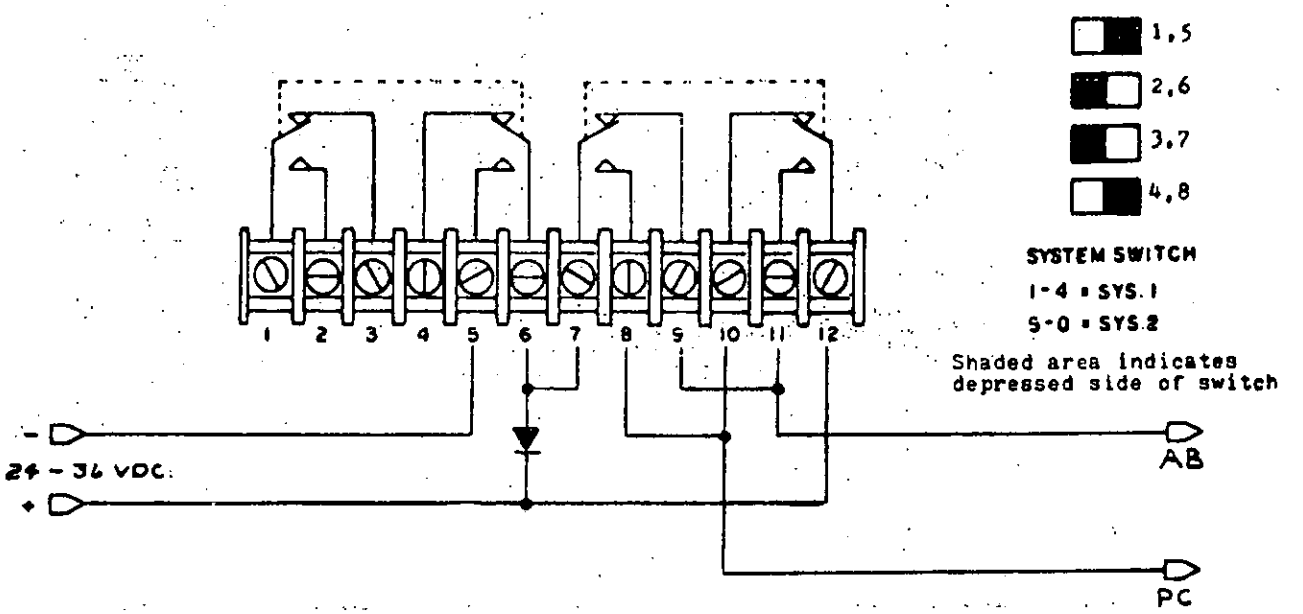
Types of secondary clocks covered under this type are:

Simplex Series 91 and 941



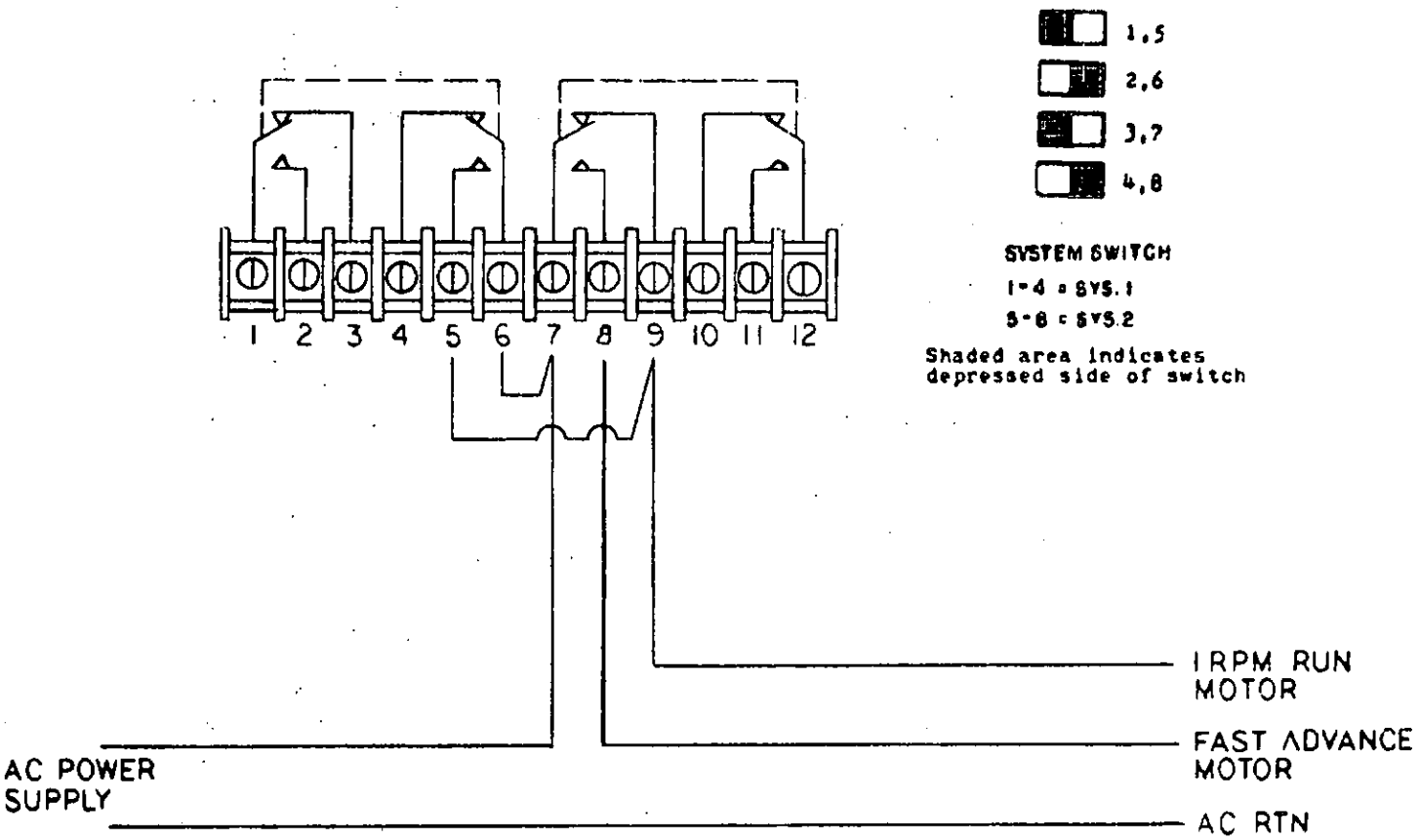
TWO WIRE MINUTE IMPULSE REVERSE POLARITY (59TH MIN) WITH 12 HOUR CORRECTION

Each hour from the 59th minute through the 49th minute a two second pulse starting at the 58th second and ending at 00 seconds will be transmitted between lines AB and PC (with AB positive with respect to PC) causing all clocks to advance each minute. From the 50th minute to the 59th minute, transmission will be such that PC is positive with respect to AB. Clocks which are less than ten minutes fast will stop at the 59th minute since their SR contacts transfer and require a pulse with AB positive with respect to PC to advance at this time. Each hour, starting at the 59th minute and 10 seconds, a total of twenty rapid pulses will be transmitted with line PC positive with respect to AB at a rate of 0.5 Hz. Clocks which are slow will be advanced at this pace. Each twelve hour period from 6:02 through 6:44 twenty-three rapid pulses will be transmitted each minute, line PC positive with respect to line AB, with transmission starting at 10 seconds after and ending at 55 seconds after. Clocks which are more than one hour slow will be rapidly advanced to correct time.



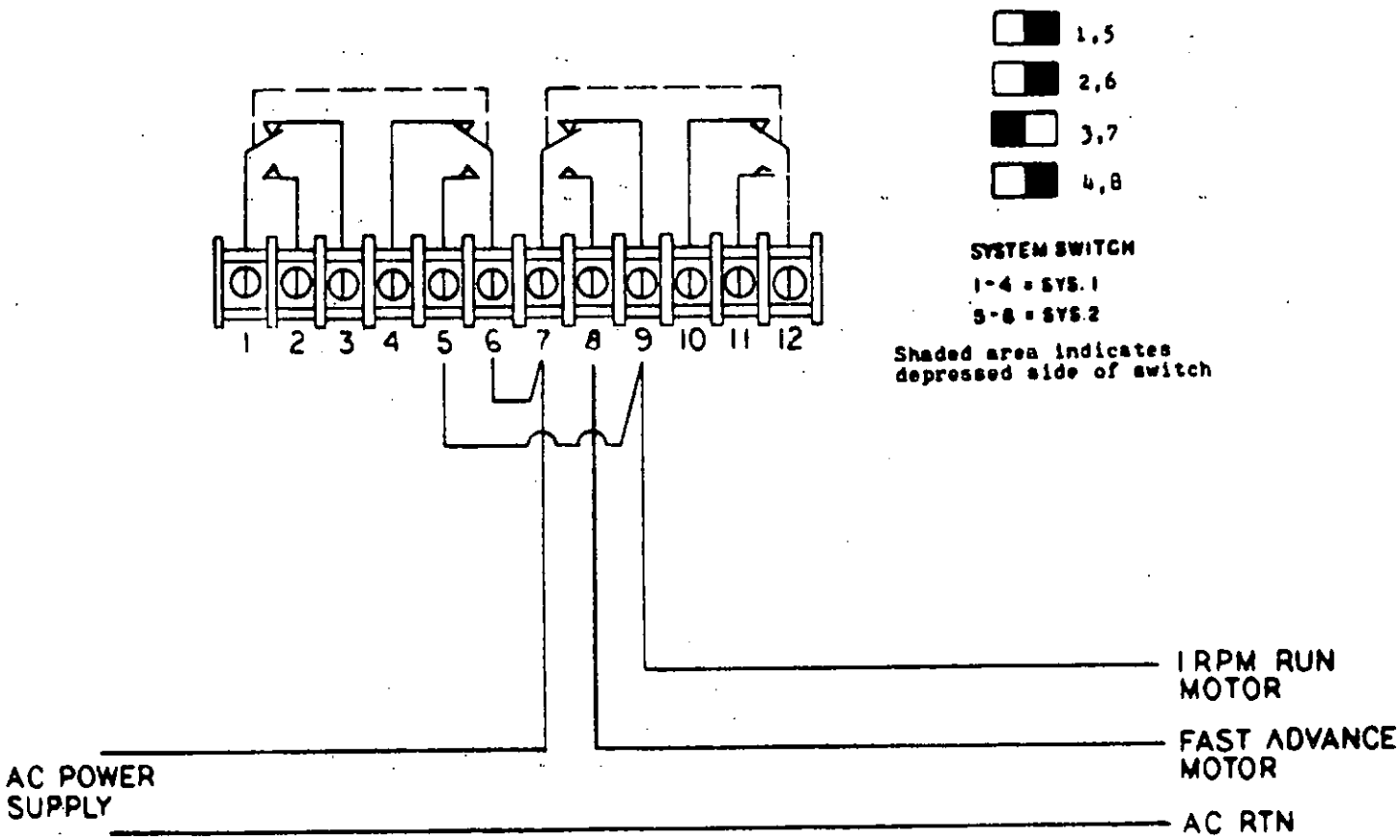
SIMPLEX DUAL MOTOR 59th MINUTE ADVANCE
Only available on I Version Eproms

Normally power is applied to the 1RPM run motor. Each hour from 58:05 through 58:59 power is removed from the 1RPM run motor and applied to the fast advance motor. Also during manual clock corrections, power is removed from the 1RPM run motor and applied to the fast advance motor for four minutes. During correction of clocks caused by power failures, power is applied to both the 1RPM run motor and the 15RPM fast advance motor for a period of 1/15th of the amount of time lost. If the time lost was greater than or equal to one hour, the correction will not begin for 6 minutes after power is resumed. This delay is for the convenience of resetting clocks due to daylight saving time changes by providing time to reset the master's current clock before clocks automatically advance back to the old time. If the time lost was less than one hour, the correction will begin immediately after power is resumed.



SIMPLEX DUAL MOTOR 45th MINUTE ADVANCE
Only available on 1 Version Eproms

Normally power is applied to the 1RPM run motor. Each hour from 44:05 through 44:59 power is removed from the 1RPM run motor and applied to the fast advance motor. Also during manual clock corrections, power is removed from the 1RPM run motor and applied to the fast advance motor for four minutes. During correction of clocks caused by power failures, power is applied to both the 1RPM run motor and the 15RPM fast advance motor for a period of 1/15th of the amount of time lost. If the time lost was greater than or equal to one hour, the correction will not begin for 6 minutes after power is resumed. This delay is for the convenience of resetting clocks due to daylight saving time changes by providing time to reset the master's current clock before clocks automatically advance back to the old time. If the time lost was less than one hour, the correction will begin immediately after power is resumed.



59TH MINUTE CORRECTION, 2-WIRE DUAL VOLTAGE
Only available on UF-2C and UF-3C Version Eproms

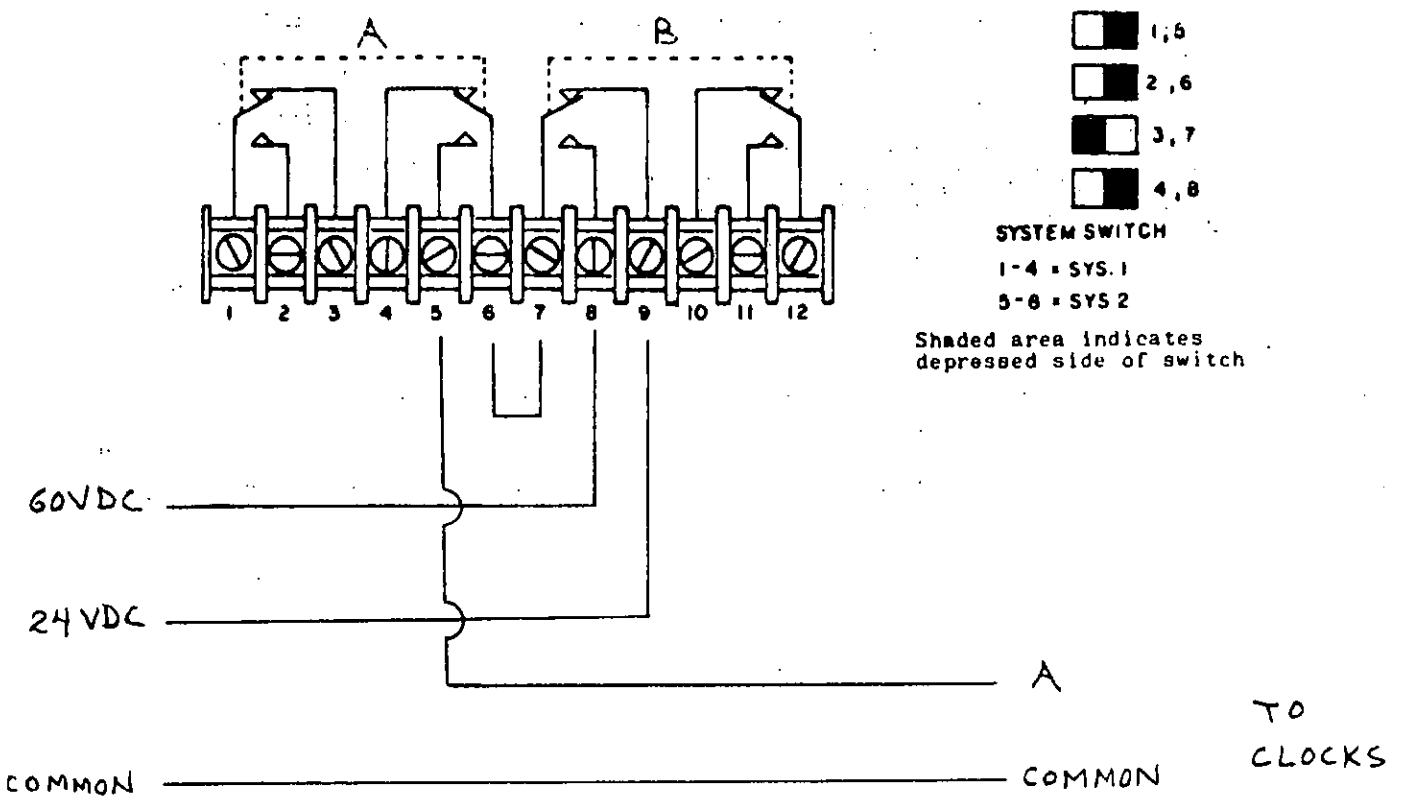
Relay B operates from 59'58" to 05'58", selecting the high voltage for the output impulse allowing the secondary clocks to advance into the next hour.

Relay A operates from 58" to 00" each minute providing the minute impulses.

Additionally, relay A operates for 1 second each 2 seconds from 59'10" to 59'50", providing correction impulses to advance any slow clocks to the 59th minute.

Types of secondary clocks covered under this type are as follows:

Cincinnati Type D-1



CINCINNATI 59TH MINUTE CORRECTION, 3-WIRE MINUTE IMPULSE
Only available on UF-2C and UF-3C Version Eproms

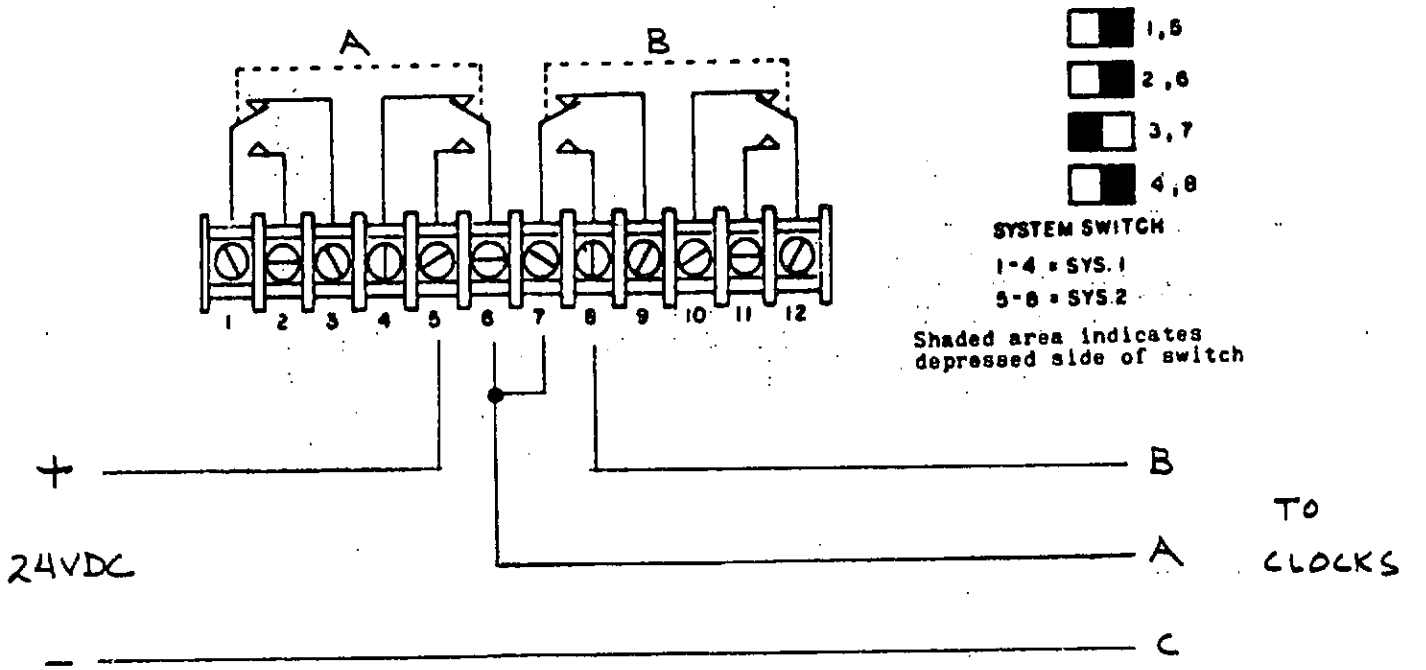
Relay B operates from 59'58" to 05'58", selecting the high voltage for the output impulse allowing the secondary clocks to advance into the next hour.

Relay A operates from 58" to 00" each minute providing the minute impulses.

Additionally, relay A operates for 1 second each 2 seconds from 59'10" to 59'50", providing correction impulses to advance any slow clocks to the 59th minute.

Types of secondary clocks covered under this type are as follows:

Cincinnati Type D-4

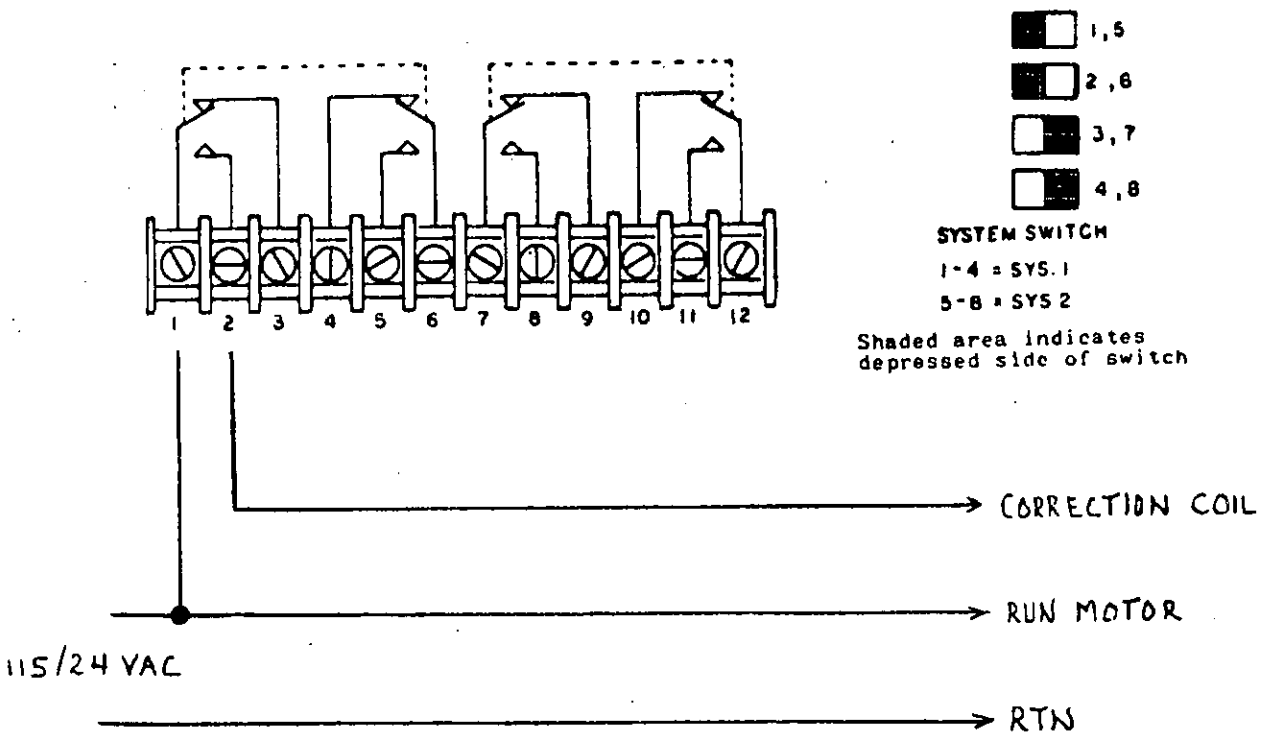


SYNCHRONOUS WIRED

115vac is contiouously applied to the clock run motor. 115vac is applied to the clock correction coil for 55 seconds each hour from XX:58:05 tOXX:59:00 to provide hourly corrections. To provide 12 hour corrections 115vac is applied to the clock correction coil for 55 seconds each four minutes from 5:03:05 through 5:47:59.

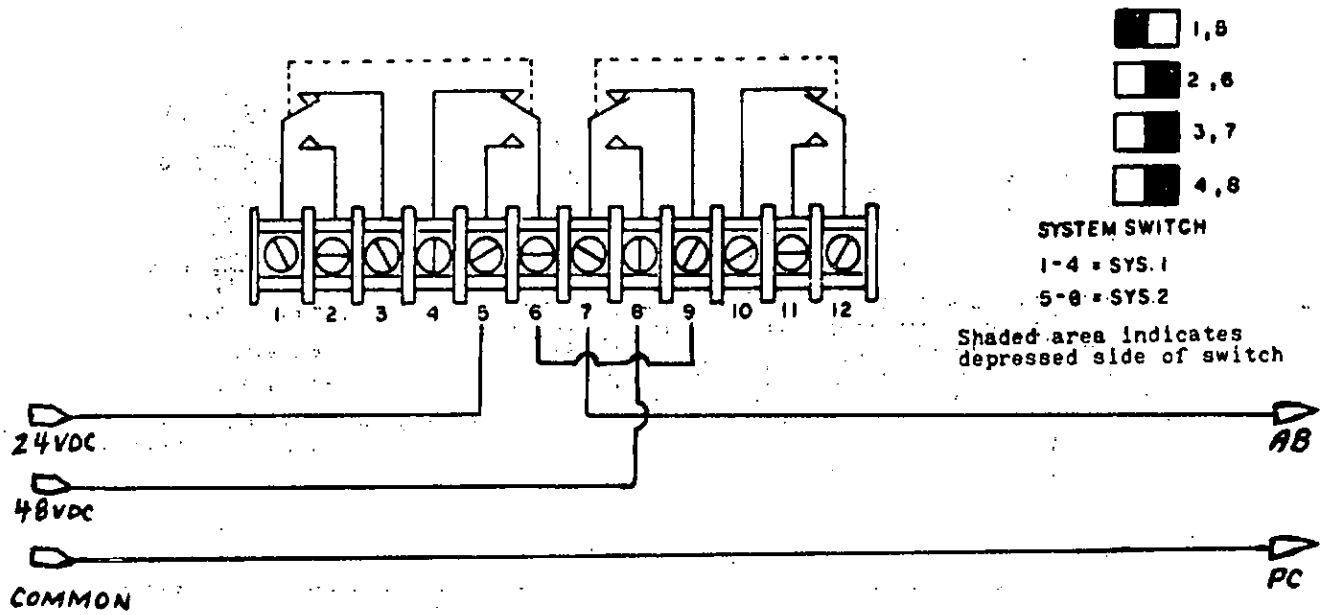
Types of secondary clocks covered under this type are as follows:

Cincinnati	D-8
Faraday	
Honeywell	ST402A

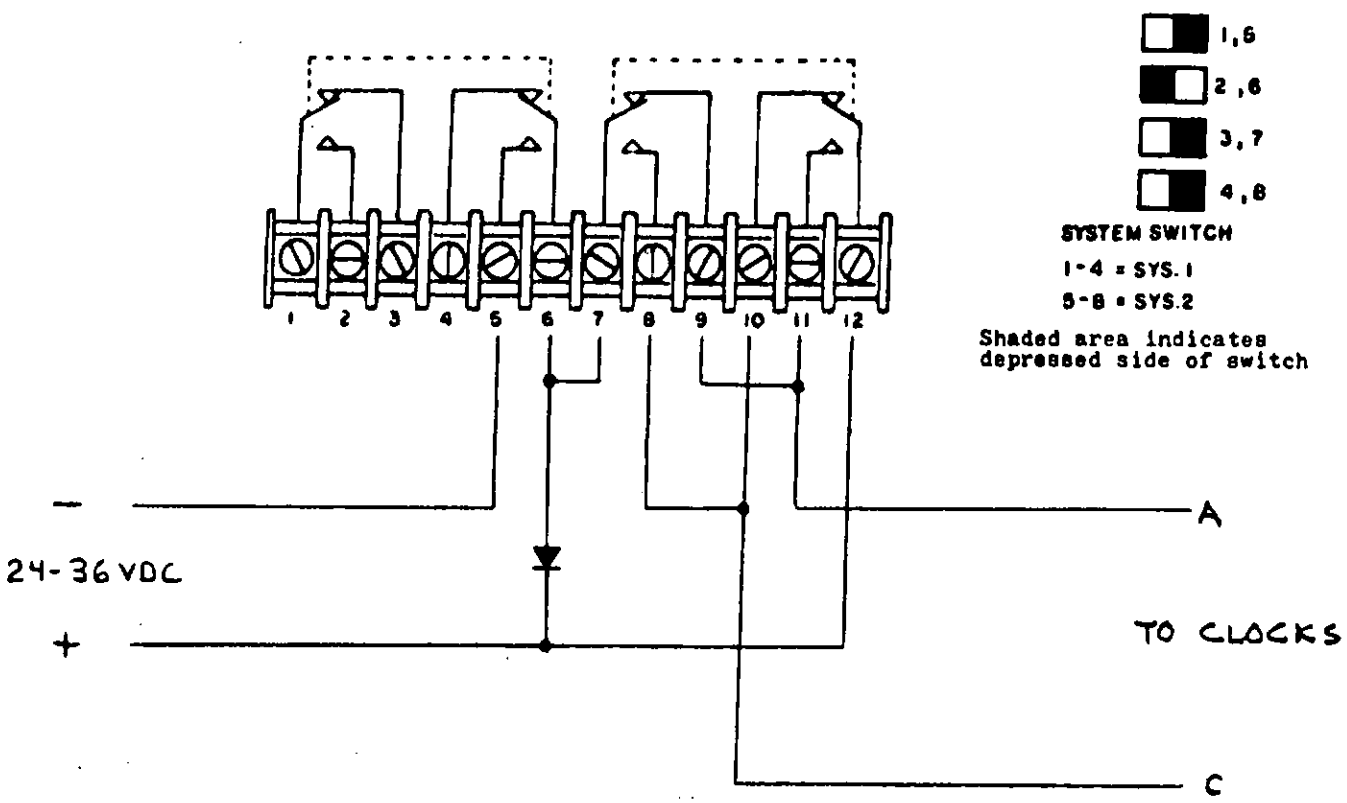


STANDARD ELECTRIC TIME AR-2 TWO WIRE DUAL VOLTAGE

Each minute from 58" to 00" a pulse of low voltage (24VDC) will be transmitted . The secondary clocks will receive the pulses until the 59th minute. At this time from 50" to 00" a higher voltage pulse (48VDC) will be required to advance to the hour.



Normal pulsing will be sent out on lines A & C from second 58 through second 00 each minute. From minute 59 through minute 48 line C will be positive with respect to line A. From minute 49 through minute 58, except from 4:49 through 5:55 AM & PM, line A will be positive with respect to line C. To provide hourly corrections, 20 rapid pulses occuring at a 0.5hz rate are transmitted on lines A&C, line A positive with respect to line C, during the 59th minute of each hour from second 10 through second 48. To provide twelve hour corrections, 20 rapid pulses occuring at a 0.5Hz rate are transmitted from second 10 through second 48 of each minute from 5:00 through 5:30 Am & PM. use a diode connected as shown below for arc suppression of the relay contacts.



LATHEM ONE YEAR LIMITED WARRANTY

This Lathem product is warranted against defects in material and workmanship for a period of one year from date of original purchase. The conditions of this warranty and the extent of the responsibility of Lathem Time Corporation ("Lathem") under this warranty are as follows:

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 instrustions 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: LIMITATION OF LIABILITY. EXCEPT IN ONLY THE LIMITED EXPRESS WARRANTY SET FORTH ABOVE, THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, REGARDING THIS PRODUCT. LATHEM SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL LATHEM BE LIABLE FOR ANY DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE DELIVERY, USE OR INABILITY TO USE, OR PERFORMANCE OF THIS PRODUCT.

7. Proof of date of purchase will be required for warranty service on this product.

8. THIS WARRANTY GRANTS SPECIFIC LEGAL RIGHTS. ADDITIONAL LEGAL RIGHTS, WHICH VARY FROM STATE TO STATE, 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 CORPORATION
200 Selig Dr. S.W., Atlanta, GA. 30378
Phone: 404-691-0400

In California

Lathem Time California, Inc.
10370 Slusher Dr.
Unit 7
Santa Fe Springs, Ca. 90670
Phone: 213-944-0902 or
800-352-4314

In Canada

Lathem Time Recorder Canada
Division of Maag & Co. Ltd.
4434 St. Catherine W.
Montreal, Quebec H3Z 1R2
Phone: 514-937-2307