SELENA
Multifunctional
LED CLOCK

Rev. V32D

KERA Technologies Inc.
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Features

- Super/Ultra Bright LEDs
- Red/Green/Blue/Yellow display
- Digital Clock in 12 or 24 hour, or Military format
- Day/Date/Month/Year alternating display option
- Day/Date/Month/Year Text display option
- Julian Day display option
- Synchronized Master/Slave Clock Systems
- Variety of ASCII Time Code and BCD sync protocols
- Twisted Pair Wired, Wire-less or Power Line Sync.
- Multi-Zone Clock
- Digital Up/Down Programmable Timer Stopwatch (99Hrs:59Min:59Sec)
- Digital Looping Up/Down Programmable Timer Stopwatch
- Automatic Up/Down Timer recovery after power failure
- Digital Stopwatch with 1 sec. and 1/100 sec. resolution
- Digital Up/Down Programmable Event Counter
- External Timer and Counter inputs interface option
- Daily Wake-Up Alarm Clock
- Weekly Programmable Timer 32 events/day/week
- Digital Inside Thermometer
- Digital Outside Thermometer
- Min/Max Temperature Memory
- High/Low Temperature Alarm
- Digital Thermostat
- Programmable Heat/Cool Thermostat 32 events/day/week
- Internal Alarm Buzzer
- Internal 10Amp Control Relays for Timers and Thermostat
- Infra Red Remote Control
- RS-232, USB and RS-485 communication and Sync.
- Power Line Communication and Sync.
- 10-Year Battery Backup option
- 14-Day Battery-Less Self-recharging backup standard
- Permanent Alarm / Event Schedule Memory
- Auto-Dimming Display option
- Automatic Daylight Savings correction
INSTALLATION

NOTE: Before installation, determine the correct voltage rating required for the particular clock model.

The Clock may be installed using special ceiling mounting kit or on a wall as per attached installation drawing and instructions.

Most models for hanging on the wall and for use as desktop should be plugged into the power line outlet using the attached power cord extending from the back panel.

Keep the clock away from water, excessive heat, moisture and dust or chemically aggressive environment, unless your model has a waterproof or a special, environmentally sealed enclosure.

POWER Connection

NOTE: Before installation, determine the correct voltage rating required for the particular clock model.

Make sure that all power is disconnected.

Please observe local electrical code requirements while installing the power connections.

For models with the power cord just plug it into available power outlet.

For models With the Power Terminal block follow the instructions:

1. Locate the power screw terminal marked “SUPPLY” on the back panel of the enclosure.

2. Connect the Power Line wires, including the Ground wire, to the corresponding terminals and tighten the screws securely.

If the Ground wire or the Ground Terminal is not available, leave that terminal unconnected.

NOTE, that in case the power supply fuse needs to be replaced, use the exact fuse rating as specified for your clock model, usually stated in the label on the back panel. Note, that aside from the fuse current protection rating, the fuses are also classified as Low Blow or Fast Blow. In most clock models the Slow Blow fuses are used.
### IR Remote Control

All operation and settings are accomplished by means of the Remote Control. The **SELENA** dedicated Remote Control is recommended, however most RCA TV compatible remotes will function properly. Use the reference list and the drawing below to determine the function of the keys used to operate the clock.

#### List of REMOTE CONTROL keys

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<th><strong>RCA Remote key</strong></th>
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<tr>
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<td>STOP</td>
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<tr>
<td>HOLD</td>
<td>PAUSE</td>
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#### REMOTE CONTROL KEYS description

- **MUTE**: 1. Activates the **Programming Mode** by pressing the MUTE key _5 times within appx. 4 seconds_.  
  2. MUTE internal Alarm Buzzer.  
  3. Stores the custom TEXT in memory.

- **TALK**: Initiates spoken announcement (optional) or start / restart the Text display scan (in selected models).

- **CLK**: Press it before operating other keys to put the Remote in the clock communication mode.

- **AP1**: Appliance **Type 1** remote operation mode  
  (not used in regular clock operation)

- **AP2**: Appliance **Type 2** remote operation mode  
  (not used in regular clock operation)

- **UP**: 1. Increments the count during data preset in clock, timer/counter or temperature presets modes.  
  2. In the Function Selection Mode, increments the number of the Function selected for (de)activation.  
  3. In the Normal Operation Mode, displays MAX TEMPERATURE MEMORY content.

- **DN**: 1. Decrements the count during data preset in clock, timer/counter or temperature presets modes.  
  2. In the Function Selection Mode, decrements the number of the Function selected for (de)activation.  
  3. In the Normal Operation Mode, displays MIN TEMPERATURE MEMORY content.
1. After invoking the remote programming mode (by pressing the MUTE 5 times), ACTIVATES Clock/Temperature data preset mode.
2. During data preset, MOVES the cursor to the next position.
3. During Hi/Lo Temperature Alarm data preset, MOVES to the next alarm data preset.
4. In Function Preset Mode, TOGGLES to Activate/Deactivate selected function.
5. Changes the display brightness when Manual Brightness Control Enabled (Fn 24).

1. After invoking the remote programming mode (by pressing the MUTE 5 times), ACTIVATES the Functions Selection Mode.
2. During the data preset, ADVANCES the screen to the next display function (time, date, temperature etc...) for preset.
3. In models with text, halt the text scanning.

INITIATES the PRESET of Timers/Stopwatch/Thermostat or Counter and text in clocks with text display. Also used to set the Zone Offset in the multi-zone clocks.

STARTS/RESTARTS the Timer/Stopwatch/Counter.
In the Programmable Thermostat mode initiates AUTOMATIC control.

RESUMES the display scrolling (alternating) mode during regular operation.

Clears or Resets specific data.
1. RESETS the Temperature to the current temperature reading while MIN/MAX Temperature or Programmable Thermostat is on display.
2. RESETS the latch while Hi/Lo Temperature Alarm is pending and Latched Alarm Mode is activated (will operate only if temperature is outside Alarm range).
3. CLEARS data to 0 in some Counter/Timer preset modes.

HALTS the Timer/Stopwatch/Counter operation.
In the Programmable Thermostat mode initiates MANUAL control.

1. HALTS the display scrolling (alternating) mode at the current display during regular operation.
2. SAVES the preset data into memory for the programmable event Timers and Thermostat.

Special operation mode.
(not used in regular clock operation)

NOTE, that many keys may be operating only in certain conditions of the display or the functions selected. Some keys may not be active depending upon the model and the installed options.

FUNCTION SETUP Procedure

If other programming was performed previously, wait at least 10 seconds for the time-out of the previous mode.
All clock Functions and Options (See “LIST OF FUNCTIONS”) can be enabled or disabled by selecting them within the Function Preset Mode. If not in the Programming Mode already, remember to first initiate the Programming mode by pressing the MUTE key 5 times within appx. 4 seconds, or by removing and then restoring the supply power.

Always, before using the Remote Control, remember to press the CLK key on the remote to set it to the clock mode.

1. To initiate the Function Preset Mode press the FUN key. The text: Fn xx will come on the display, where xx is the function ID number.
2. Using the UP or DN keys select the Function ID Number to be (de)activated (See “LIST OF FUNCTIONS”).
3. Enable / Disable the selected function by pressing the NXT key until a DOT in the lower-right corner of the display comes ON / OFF. When the DOT is OFF, the Function is disabled.
4. Wait for several seconds without pressing any keys. The clock will resume normal operation.

NOTE, that some functions may not be available in your particular clock model depending upon the installed options. In such case any attempt to enable these functions will be ignored by the system.
LIST OF FUNCTIONS

In the Function Selection Mode the display of the functions is preceded by the text “Fn” followed by the Function ID Number.

FUNCTION
ID NUMBER

Fn 0 INSIDE TEMPERATURE thermometer display with programmable Lo/Hi Alarm and Min/Max Memory.
The Clock may have an internal or external temperature sensor that monitors the local temperature. See also Fn 1, 15, 27, 61, 71, 93, 94 and 95.

Fn 1 OUTSIDE TEMPERATURE thermometer display with programmable Lo/Hi Alarm and Min/Max Memory.
An EXTERNAL temperature sensor can be connected to the screw terminal accessible on the back panel of the clock’s enclosure. The sensor may be located up to several hundred feet (meters) away from the clock by extending its wiring with any type of a 2-conductor cable. See also Fn 0, 15, 27, 61, 71, 93, 94 and 95.

Fn 2 MONTH:YEAR.WEEKDAY display (7 segments)

Fn 3 HOURS:MINUTES.SECONDS display (7 segments)

Fn 4 HOURS:MINUTES.WEEKDAY display (7 segments). Also used to display JULIAN DAY when Fn 44 is enabled.

Fn 5 DATE:WEEKDAY.MONTH display (7 segments)

Fn 6 DATE:MONTH.YEAR display (7 segments).

Fn 7 HOURS:MINUTES.SECONDS Programmable Up/Down Timer/Stopwatch or Up/Down Event Counter Display when selected.
Start, Stop and Reset of the Timer or Counter is accomplished by operating the Remote Control keys or the optional External Inputs Terminals hardware (see Fn 36).

Fn 8 12 HOUR time display format.
When this function is not enabled, the default format is 24 hour. In the 6-digits clocks, when this function is enabled, the “seconds” display may be set to show the text “AM/PM” if the function Fn 84 is also enabled.

Fn 9 6-DIGITS display format.
This function should not be altered. It selects the 4 or 6 digits display format.

Fn 10 INVERTED display MODE (used for 4 digits displays).
This function causes the display to be inverted 180 degrees so that the clock can be rotated upside-down.

Fn 11 Enable for the Preset of the Sync Frequency for the Power Line Carrier sync. Also used for the Protocol Format Selection bit 0 for ASCII Time Code or the Protocol Selection bit 0 for the Minute Impulse sync mode.
This function is also used when the clock is configured for operation in the Master/Slave System Clock Network (see section “MASTER/SLAVE SYSTEM CLOCK NETWORK”).

Fn 12 Enable for the Colon Blinking when the sync is detected for the Power Line Carrier sync. Also used for the Protocol Format Selection bit 1 for the ASCII Time Code (also see Fn 11) or the Protocol Selection bit 1 for the Minute Impulse sync mode.

Fn 13 Enable to select the Hard Wired sync signal for systems similar to the Power Line Carrier Sync but without the frequency. Also used for the Protocol Format Selection bit 2 for the ASCII Time Code or Protocol Selection bit 2 for the Minute Impulse sync mode (also see Fn 11 and Fn 12).

Fn 14 24 HOUR SYSTEM SYNC mode.
This function is used when the clock is configured for operation as a slave in the Master/Slave System Clock Network. When this function is not enabled, the default is 12 hour sync mode.

Fn 15 CELSIUS or FAHRENHEIT units selection for all temperature displays.

Fn 16 CONTROL RELAY LATCHING enable during the LO/Hi Temperature Alarm and Timer/Counter Alarm.
When this function is enabled, the relay will remain latched in OFF state when the Alarm is detected even after the temperature returns to normal. To reset the latched state back to ON, press the CLR key (twice) on the remote, while the temperature is within NON-ALARM range.
In the stopwatch modes the relay will remain in the state as controlled by Fn18 until the timer is reset.

Fn 17 ALARM BUZZER enable during the LO/Hi Temperature Alarm and Timer/Counter ALARMS.
NOTE that when the Wake-Up Alarm is set by disabling Fn 39, the Alarm Buzzer is always enabled.
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Fn 18  LOW/HIGH Temperature and Timer ALARM Relay Action.
1. In Low/High Temperature Alarm mode:
   When set, this function enables the internal relay to be switched OFF when the Temperature ALARM occurs and
   ON when there is NO ALARM condition.
   When this function is NOT SELECTED the internal relay will ONLY be switched OFF in response to the
   HIGH Temperature or Timer ALARM and ON when the Temperature is LOWER than the PRESET for HIGH ALARM
   even if it is lower than the preset LOW ALARM.
2. In Timer/Stopwatch Alarm mode:
   When set, this function enables internal relay to be switched OFF when the Timer is NOT Active or when the Timer
   ALARM occurs (count-down finished). The internal relay will be switched ON when the counting is pending.
   When this function is NOT SELECTED the internal relay will ONLY be switched ON when the Timer ALARM occurs
   (counting finished).
   See also Fn 16, 17, 37.

Fn 19  Temperature display with Decimal Point. Almost always may be used only in 6 digits displays or special feature.

Fn 20  MIN/MAX Temperature Memory display Enable.

Fn 21  BCD Time Code Slave receiver Enable. (compatible with the Simplex BCD code for 50Hz and 60Hz line)

Fn 22  POWER LINE FREQUENCY BASED TIME AUTO-CORRECTION Enable. Adjusts automatically to 50/60Hz line.

Fn 23  POWER LINE CARRIER SYNC Enable. Requires the Master clock signal presence in the power line.
   (Also see Fn 11,12,13,14)

Fn 24  MANUAL BRIGHTNESS CONTROL Enable.
   When set, this function allows for the manual control of the display brightness by activating the “NXT” key. Once set,
   the brightness level will be memorized even if this function is subsequently disabled.

Fn 25  AUTO-DIMMING BRIGHTNESS CONTROL Enable (optional).

Fn 26  INVERTED SECONDS display for 6 digits model. Do not alter this setting.

Fn 27  INTERNAL TEMPERATURE PROBE selection for the operation in the Thermostat and Thermometer modes and
   Temperature Min/Max memory functions. If not enabled, the EXTERNAL sensor is used.

Fn 28  LOOPING TIMER ENABLE. For both UP and DOWN counting, the timer/clock will reset and restart itself
   automatically upon reaching the PRESET value. See also Fn 87.

Fn 29  Hi/Lo Temperature Alarm Display Enable. (see also Fn 27).

Fn 30  Hi/Lo Temperature Control and Alarm Mode Enable. (see also Fn 27).

Fn 31  EVENT UP/DOWN COUNTER mode selection. (Function Fn 39 must also be enabled)
   When selected, this function enables the Counter of Pulses presented at the COUNTER INPUT terminal if the
   External Counter/Timer Inputs are enabled (by Fn 36) or “Clocked” by the remote control UP and DN keys if the
   external inputs are not enabled or if the function Fn 59 is enabled.
   The Counter Result (count) display is enabled by enabling Fn 7.
   The Counter operates as UP-COUNTER when the preset count is equal 000000 or as UP and DOWN-COUNTER
   when the preset is different than 000000 but will not allow for clocking down from the count 000000.
   NOTE that in the EVENT COUNTER mode the range is 9999 if the 6-digit display format is not selected (see Fn 9).

Fn 32  2-WIRE (RS232/485) MASTER CLOCK Mode for the Master-Slave synchronized system.
   (also see Fn 46, 53, 54, 55, 88, 89)
   When enabled, this mode will cause the clock to function as a Synchronized System Master Clock.
   See also functions Fn 33 and Fn 34.
   NOTE: This mode may be used when one of the External Sync Communication options is installed.

Fn 33  2-WIRE (RS232/485) SLAVE clock Mode in DISPLAY REPEAT synchronized system.
   All display data will be copied as sent from the Active Master clock display in real time. The Time data will not be
   updated in the Slave clock unless the function Fn 34 is also enabled. See also Fn 88, 89.
   Only the clock Preset/Programming function can override this mode.
   In some Master-Slave modes this function may also be used to enable certain Repeater modes (see Fn53).
   NOTE: This mode may be used when one of the External Sync Communication options is installed.

Fn 34  2-WIRE (RS232/485) SLAVE clock Mode in TIME synchronized system. (also see Fn 46, 88, 89)
   Only the time data will be synchronized in this mode. All other local options and modes may be still selected.
In some Master-Slave modes this function may also be used to enable certain Repeater modes (see Fn53).

**NOTE:** This mode may be used when one of the External Sync Communication options is installed.

**Fn 35** STOPWATCH mode with 1/100 resolution. This mode can only be used in the COUNT-UP mode.
See also Fn 36, 38, 39, 58, 59.

**Fn 36** TIMER/COUNTER Control by EXTERNAL Signals or Contacts (switches).
When selected, this function enables the External Dry Contacts to control the Up/Down Timer or Counter operation.
Dry Contacts must be wired to the INPUT terminals. For this function to control the Up/Down Timer, the TIMER/STOPWATCH mode (Fn 39) must be enabled AND for the Counter operation also the Event Up/Down Counter option (Fn 31) must be enabled.
Automatic periodic or persistent display of the TIMER or COUNTER readings is enabled by Fn 7. Otherwise, each time the Timer/Counter is Started, Stopped or Reset, the display will switch automatically to that function. Many configurations of the Timers/Counters are possible using this option. Consult the manual for details.
Also see Fn 28, 35, 38, 39, 58, 59, 87.

**Fn 37** TIMER RELAY Control.
When this function is enabled, the Internal Relay is controlled by the Count-Down Timer/Counter and NOT by the LOW/HIGH Temperature Alarm.
Also see the description for Fn 16 and 18.

**Fn 38** MINUTES:SECONDS display resolution in Timer/Stopwatch mode.
Timer/Stopwatch range is 59min:59sec.
When this function is not enabled, the Timer/Stopwatch default display is HOURS:MINUTES.

**Fn 39** TIMER/STOPWATCH mode. (not daily/weekly timers) (See also Fn 31 for Event Counter mode)
When selected, this function enables the TIMER/STOPWATCH mode of operation.
The Timer operates as the UP-TIMER when the preset time is equal 0:00.0 (0 hours:0 minutes:0 seconds) or as the DOWN-TIMER when the preset is different than 0:00 unless Fn 87 is set for UP timer with a preset limit.
Also see Fn 28.
When the function Fn 39 is NOT ENABLED the default is the WAKE-UP ALARM Timer mode. It operates then in the HOURS:MINUTES format and allows for presetting of only ONE Alarm Time to be repeated every day.
See also Fn 38 and Fn 37.

**Fn 40** ALTERNATING DISPLAY SEQUENCE EQUAL SPLIT.
When selected, this function will set equal display persistence periods for each of the seven possible display screens as setup by enabling any combination of the functions Fn 0 to Fn 7.

**Fn 41** SET TEMPERATURE DISPLAY PERSISTENCE LONGER THAN the CURRENT TIME DISPLAY.
When selected, this function will make the External Temperature (see Fn 1) to be displayed longer than the Current Time clock Display (see Fn 3).
Each of the seven possible display modes is setup by enabling any combination of the functions Fn 0 to Fn 7.

**Fn 42** ENABLES automatic HALT of UP/DOWN Timer during Power Failure (optional).
This option can be used only if the function Fn 42 is installed and Enabled.
When the AC Power fails, the Up/Down Timer will recover in the HALT mode after the power returns. In effect, the timer will lose the time elapsed during the power failure but the last valid count will be restored.

**Fn 43** ENABLES automatic RECOVERY of UP/DOWN Timer after Power Failure (optional).
When the AC Power fails, the Up/Down Timer will recover after the power returns without any loss of the elapsed time and will continue counting in a mode as operating before power failed.

**Fn 44** JULIAN DAY mode selection for display enabled by Fn 4 (optional).
For 4 digit displays the format is: “dddd” where “ddd” is Julian Day reading from 1 to 365 (366 for leap years).
For 6 digit displays, 2 youngest digits will indicate the current year.

**Fn 45** MILITARY TIME FORMAT with leading zeroes.

**Fn 46** ASCII Time Code protocol selection for the Master-Slave communication. Also see the description for Fn 32, 33, 34, 11, 12, 13, 88, 89.

**Fn 47** Minute Impulse synchronization mode. See also Fn11 and Fn12 for the protocol selection.

**Fn 48** WEEKLY PROGRAMMABLE TIMER, 32 EVENTS PER DAY FOR 7 DAYS repeated each week.
When selected, this function will enable the programming and operation of up to 32 events/day for each day of the week separately. The timer will control the internal Alarm Buzzer and the internal Relay as enabled by the functions Fn 17 and Fn 37 and optionally an Up/Down timer and a second internal Relay programmable per event.
Fn 49  TIMER / COUNTER End-of-Count Alarm ( Buzzer or Relay ) persistence limited to 3 seconds.

Fn 50  MULTI-ZONE slave sync Enable using the Zone Offset in internal memory ( see Fn51 ).

Fn 51  MULTI-ZONE slave Zone Offset programming Enable ( see Fn50 ). Enable this function only to program the zone offset value. Disable this function when finished.

Fn 52  WEEKLY PROGRAMMABLE THERMOSTAT, HEAT / COOL with AUTO SWITCH-OVER, 32 EVENTS PER DAY separate for each of 7 DAYS, repeated each week. When selected, this function will enable the programming and operation of up to 32 events/day for each day of week separately. The thermostat will control up to 2 internal relays; one for Heating and the other for Air-Conditioning control, or 1 relay for either Heating or Cooling ( A.C. ). Manual override also possible.

Fn 53  MASTER-SLAVE SYNC SIGNAL RANGE EXTENDER-REPEATER function. See description in the manual.

Fn 54  Time Slot Channel selection bit 0 for RANGE EXTENDER ( see Fn 53 ).

Fn 55  Time Slot Channel selection bit 1 for RANGE EXTENDER ( see Fn 53 ).

Fn 56  RESERVED FOR SYSTEM CONFIGURATION, AFFECTS THE SECONDS DISPLAY ( DO NOT ALTER )

Fn 57  STOPWATCH AS PERIOD TIMER with automatic restart of UP TIMER when the External Start input is activated. Note that this option applicable mainly when the EXTERNAL TIMER INPUTS are installed and enabled by Fn 36. The display will show only a steady reading of the last test and is updated each time the START is activated.

Fn 58  External STOP input works like HALT in the STOPWATCH TIMER mode. The timer will be “HALTed” only and can be resumed by reactivating the START. This feature may also be used when a TIMER ENABLE function is necessary when the EXTERNAL TIMER INPUTS are installed and enabled by Fn 36.

Fn 59  REMOTE CONTROL enabled when EXTERNAL TIMER/COUNTER inputs used. This function enables the remote control to operate the timer concurrently with the external Start/Stop/Reset inputs ( if installed ).

Fn 60  DAYLIGHT SAVING AUTOCHANGE ( CANADA and USA )

Fn 61  RESERVED FOR SYSTEM CONFIGURATION. CONTROLS ANALOG TEST LIKE TEMPERATURE AND AUTODIMMING ( DO NOT ALTER ).

Fn 62  TOTAL DISABLE of REMOTE CONTROL. (TOTAL Lock-out) All subsequent COMMUNICATION with the clock via the Remote Control may be disabled by enabling this function (to prevent unauthorized operation).

Fn 63  PARTIAL DISABLE of REMOTE CONTROL. (PARTIAL Lock-out) All subsequent PRESETS of the CLOCK TIME and FUNCTIONS via the Remote Control may be disabled by enabling this function (to prevent tampering with the presets). Other communication like Timers and dimming will still remain accessible.

To regain the control via the remote, the supply power has to be removed for a few seconds or an optional hardware keypad must be activated at least once. The clock will then respond to the remote control for appx. 33 seconds allowing for the removal of this Lock-Out if necessary.

Fn 64  DATE / TEXT display mode selection bit 0 ( see Fn 85 )

Fn 65  DATE / TEXT display mode selection bit 1 ( see Fn 85 )

Fn 66  DATE / TEXT display mode selection bit 2 ( see Fn 85 )

Fn 67  RESERVED

Fn 68  External START input may be used as START/STOP/RESET in the STOPWATCH TIMER mode. The STOP and RESET inputs do not have to be used. This feature may be used only when the EXTERNAL TIMER INPUTS are installed and enabled by Fn 36.

Fn 69  External START input may be used as START/STOP in the STOPWATCH TIMER mode. The STOP input does not have to be used. To RESET the timer, the RESET input must still be used. This feature may be used only when the EXTERNAL TIMER INPUTS are installed and enabled by Fn 36.
Fn 70 to Fn 71  RESERVED

Fn 71 Selection of the temperature result display averaging mode as either slow (Fn71 disabled) or fast (Fn71 enabled)
Note, that the slow mode will calculate a more accurate, average reading using several test samples. See also Fn 0, 1, 15, 27, 61, 93, 94 and 95.

Fn 72 TIMERS / STOPWATCH display in the TEXT display section (see Fn 85)
Display format: “ HH-MM-SS-hh “

Fn 73 TIMERS / STOPWATCH display in the TEXT display section (see Fn 85)
Display format: “ Tmr  HH-MM-SS “

Fn 74 TIMERS / STOPWATCH display in the TEXT display section (see Fn 85)
Display format: “ TIMER  MM-SS “ or “ TIMER  HH-MM “ depending upon the status of Fn 38 and if the timer is under 1 hour.

Fn 75 TEMPERATURE display in the TEXT display section (see Fn 15, Fn 85)
“IN” probe temperature display format: “ IN  XXX  C (F) “

Fn 76 TEMPERATURE display in the TEXT display section (see Fn 15, Fn 85)
“OUT” probe temperature display format: “ OUT  XXX  C (F) “

Fn 77 TEMPERATURE display in the TEXT display section (see Fn 15, Fn 85)
“IN” probe temperature display format: “ TEMP  XXX  C (F) “

Fn 78 JULIAN DAY display in the TEXT display section (see Fn 85)

Fn 79 REAL TIME CLOCK display in the TEXT display section (see Fn 85)
(Display format selectable by Fn 8 and Fn 84)

Fn 80 TIME ZONE / Customer TEXT DISPLAY ENABLE (see Fn 85)

Fn 81 EXTRA DATA transmitter enable in Master-Slave system. (see Fn 34, 53, 82)
When enabled in the Master or Repeater (see Fn 53) clock that is a part of the Master-Slave system, some data, like the temperature, will be transmitted to the slave clocks.

Fn 82 EXTRA DATA receiver enable in Master-Slave system. (see Fn 34, 53, 81)
When enabled in the Slave that is a part of the Master-Slave system, some data, like the temperature, will display as in the Master clock.

Fn 83 SLAVE INTERNAL RELAY CONTROL ENABLE.
When enabled in the Slave that is a part of the Master-Slave system, the internal relay will be set to the same state as the relay in the Master clock. (see Fn 34, 53)

Fn 84 AM/PM text indicator enable for 12 hour format of the clock time display in 6-digits clocks or in text (see Fn 8)

Fn 85 DATE / TEXT, ZONE TEXT and other text formats display ENABLE.
This function must be enabled to display any data in the text section.

Fn 86 TIME ZONE / Customer TEXT DISPLAY programming ENABLE (see Fn 80)
Enable this function only to program the contents of the Zone Text display. Disable this function when finished.

Fn 87 UP Timer/Stopwatch with a PRESET value. When enabled, it will cause the timer to count up from 00:00:00 and stop at the preset value. The Alarm relay and/or buzzer activation at the end of the count-up is possible (see Fn 16, 17, 18 and Fn 37). A Cycling (looping) timer mode is also available (see Fn 28).

Fn 88, Fn 89 Communication speed (Baud rate) selection for RS232, RS485 and wire-less communication.
OFF, OFF = 9,600 BPS
OFF, ON = 1,200 (or 4,800) BPS
ON, OFF = 600 BPS
ON, ON = 300 BPS

Fn 90 SYNCHRONIZE the SECONDS ONLY in the slave in the Master-Slave system.
When enabled in the slave, this function will cause the slave to update ONLY the seconds in the time clock.
This feature may be used when a different time zone is needed on some selected slaves.

Fn 91 SYNCHRONIZE the MINUTES AND SECONDS ONLY in the slave in the Master-Slave system.
When enabled in the slave, this function will cause the slave to update ONLY the minutes and seconds in the time clock. The sync will be executed on the 5th minute of each 10-minute period.
This feature may be used when a different time zone is needed on some selected slaves. Note, that it is sometimes better to have both functions: Fn 90 and 91 enabled.

**Fn 92**  RESERVED FOR SYSTEM CONFIGURATION. (DO NOT ALTER)
SKIP the SECONDS DISPLAY. This is a system setup function for displays with 4 digits and with alphanumeric text.

**Fn 93**  Selection of the installed temperature probe type as either 50Kohm (Fn 93 disabled) or 100Kohm (Fn 93 enabled) model of the standard Selena probe selection. See also Fn 0, 1, 15, 27, 61, 71, 94 and 95.

**Fn 94, 95** Selection of the text displayed in the digital section of the display during the temperature test of the Internal and External probe. See also Fn 0, 1, 15, 27, 61, 71, 94 and 95.

<table>
<thead>
<tr>
<th>Fn 94</th>
<th>Fn 95</th>
<th>Displayed text</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>“In” and “Out”</td>
</tr>
<tr>
<td>0N</td>
<td>OFF</td>
<td>“Air” and “h2o”</td>
</tr>
<tr>
<td>0FF</td>
<td>ON</td>
<td>“Air” and “Pool”</td>
</tr>
<tr>
<td>0N</td>
<td>ON</td>
<td>“Pool” and “Out”</td>
</tr>
</tbody>
</table>
CLOCK SETUP

After the clock has been powered down for longer than 2 weeks the time keeping system may have to be preset to the current time and date again.

NOTE:
If a 10 Year Lithium Battery Backup option is installed, the clock will preserve the correct timekeeping for up to appx. 10 year period.
Such battery should be replaced at least once every 10 years, even if no power down occurred.
If a Battery-Less option is installed, each power down period may last up to at least 14 days. It will recharge itself automatically within several minutes when the power is restored.

INITIATING REMOTE CONTROL operation

NOTE that the Remote Control may have been locked-out by enabling the function Fn62 or Fn63.
Irrespective of any previous settings, the clock will always accept the Remote Control commands for a period of appx. 33 seconds following each power up and this period is extended by further 33 seconds whenever a valid key on the remote is activated.
During that initial period the functions Fn62 and/or Fn63 may be disabled to cancel the Remote Control lock-out.
Always, before using the Remote Control, remember to press the CLK key to set the remote to the clock mode.
If the Remote Control is Enabled and the power has been present for longer than appx. 33 seconds, press the MUTE key 5 times within appx. 4 seconds period to initiate the clock PROGRAMMING mode. This mode time-out is extended by further 33 sec. each time a valid key is pressed. If that timer expires, the MUTE button has to be activated again 5 times (within appx. 4 seconds) to restart the programming mode.

TIME / DATE SETUP

After the power-up, the clock may display the text: “SEt” if the internal backup ran “out of charge” or the clock was not previously set. If however the time is still correct, the clock will resume the normal operation.

NOTE, that it is advisable that the display be set to indicate the Real Time clock ( not the timer or temperature or other data ) before the time / date programming is initiated. This may be easily achieved by pressing the SCAN key on the remote until the clock time comes on the display. If non of the functions Fn 2 to Fn 6 are enabled, initiate the clock time programming mode as described previously and press the FUN key to jump to any of the time or date screens, and then continue programming of the clock time / date as described below.

After initiating the clock PROGRAMMING mode as described previously, perform the following:
1. Press the NXT key to initiate the Clock Time Preset Mode and with UP and DN keys set the time minutes and hours.
2. Using the FUN key scroll to the display screen with month and year, and with UP and DN keys set the current data.
3. Using the FUN key scroll to the display screen with date and month, and with UP and DN keys set the current date.
4. Using the FUN key scroll to the display screen with day-of-week and with UP and DN keys set the current day.
5. Wait for several seconds without pressing any keys. The clock will resume normal operation.

NOTE: During programming use the “NXT” key to move the cursor when needed.

NOTE, that the clock Seconds will RESET to 00 when the “CLR” key is pressed during the real time clock programming.

DISPLAY MODE SETUP

Several Clock Display screens can be enabled/disabled by enabling/disabling the corresponding Functions: Fn 0 to Fn 7.
Initiate the Function Preset Mode ( See the “LIST OF FUNCTIONS” section ) by following the steps listed in the “FUNCTION SETUP Procedure”.

When more than one display mode is enabled, the clock will display these screens in an ALTERNATING fashion.
For example: if Fn 3, Fn 2 and Fn 1 are enabled, the display will start with HOURS:MINUTES display followed by
MONTH:YEAR display, followed by EXTERNAL TEMPERATURE display and all over again: HOURS:MINUTES display followed by ... etc...etc...

NOTE, that the Real Time Clock mode (Fn 3), when alternating with other displays, always persists on the display the longest (appx. 10 sec) while other displays will each remain on for shorter periods (appx 5 sec). This persistence split may be altered by enabling the functions Fn 40 and / or Fn 41.
If only one display mode is enabled, it will remain on the display all the time.

All three Time display Formats are available in all SELENA clocks.
The Function Fn 8 can be used to select between the 12 and 24 hour format.
To select the Military Time format, enable the function Fn 45.
To select the display of AM or PM text indicator in the 6-digit clock, or in the Text display, enable the functions Fn 8 and Fn 85.

HALTING the ALTERNATING DISPLAY in the Digital Time section

The user may (ON DEMAND) HALT the alternating display by pressing the HOLD key at any time. The screen currently on the display will remain active until either a programming mode is initiated or the SCAN key is pressed.
Similarly, whenever the Timer/Counter START, STOP or RESET is performed externally or via the remote, the display will switch to the timer/counter mode. Press the SCAN key to return to other display screens.
To scroll quickly through the enabled screens, press the SCAN key repeatedly.

NOTE: when the function Fn 62 is enabled, ALL COMMUNICATION with the clock via the remote control is DISABLED.
To regain the remote control access disconnect the power momentarily, then restore it and disable Fn 62 within 33 seconds.
Also see the function Fn 63 to disable the remote communication except the timer functions and the brightness control.

DATE / TEXT and ZONE Text display
( Optional Feature )

The TEXT option may be activated by enabling the function Fn 85.
In clocks with the optional Alpha Numeric text display installed, several modes for displaying of the current date and other text modes may be selected by enabling the functions as per the table below:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Fn64</th>
<th>Fn65</th>
<th>Fn66</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>* no date display</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>FRI-OCT-12</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OCT-12-FRI</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>12-OCT-FRI</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>FRI-12-OCT</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>12-OCT-2007</td>
</tr>
<tr>
<td>6</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OCT-12-2007</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>2007-12-OCT</td>
</tr>
</tbody>
</table>

* NOTE: If the Functions Fn 64, 65, 66 are set to 000, the Date will NOT be displayed. However other text modes may still be activated and will display in an alternating manner if more than one is enabled.

Mode “8” Fn 72   HH-MM-SS-hh ( timer or counter ) ( also see Fn 35,38,39, )
Mode “9” Fn 73   Tmr  MM-SS ( timer ) ( also see Fn 35,38,39, )
Mode “10” Fn 74   TIMER HH-MM ( timer or counter ) ( also see Fn 35,38,39, )
Mode “11” Fn 75   OUT  25 C ( or 77 F ) ( also see Fn 0 , Fn 1 and Fn 15 )
Mode “12” Fn 76   IN   25 C ( or 77 F ) ( also see Fn 0 , Fn 1 and Fn 15 )
Mode “13” Fn 77   TEMP 25 C ( or 77 F ) ( also see Fn 0 , Fn 1 and Fn 15, 27 )
Mode “14” Fn 78   DAY  245 ( Julian day of the year )
Mode “15” Fn 79   HH-MM-SS  AM/PM ( real time clock ) ( also see Fn 8 , 45, 84 )
Mode “16” Fn 80   TIME ZONE / Customer TEXT DISPLAY ( also see Fn 86 )

NOTE 1: In order to make any Text display alternate with other Text, enable more than one text display mode.

NOTE 2: The alternating text display is "halted" automatically if the FUN key is pressed or whenever any of the clock programming modes is initiated. To resume the alternating text display after programming, press the TALK key.
HALTING the ALTERNATING DISPLAY in the TEXT section

User may (ON DEMAND) HALT the alternating display by pressing the FUN key at any time. The screen currently on the text display will remain active until the TALK key is pressed.
To scroll quickly through the enabled text screens, press the TALK key repeatedly.

IMPORTANT! Some TEXT modes may NOT be available in some clock models.

ZONE TEXT Setup

SELENA clocks equipped with the alphanumeric TEXT display option can display any custom programmed text, for instance the time ZONE name. The text is stored in a permanent memory and will remain there until changed, even without power.

To Enable the ZONE TEXT PRESET mode, enable the function Fn 86. The function Fn 85 must also be enabled.

NOTE that the clock programming mode DOES NOT HAVE TO BE ACTIVATED to program the ZONE TEXT.

1. Press the SET key to initiate the ZONE TEXT Preset Mode.
The left-most character in the Text display section will begin to flash.
NOTE, that if the character has been previously set as " " (space) it may not show as flashing. Continue to the next step.
2. Press the UP or DN key to preset the character.
Use the NXT key to move the flashing cursor to the next position.
3. When finished programming of all characters, press the MUTE key to store the entire text in the internal memory.
4. To DISABLE the text preset mode, disable the function Fn 86.
When this function is disabled, the SET key will not activate the text preset mode, and may be used normally for all other timer/counter modes.
5. If the TEXT / DATE alternating mode was set as active, remember to press the TALK key after the programming of the text is finished in order to resume the alternating mode.

WAKE-UP ALARM CLOCK Setup

SELENA can be set to function as an Alarm Clock and perform programmable Wake-up Alarm for each day until disabled.
To enable the WAKE-UP ALARM mode, make sure that the functions Fn 39, 31 and all other Timer/Counter and Thermostat modes are DISABLED.
In this mode only HOURS:MINUTES can be set and during this preset the display will always operate in the 24-hour format.

NOTE that the programming mode DOES NOT HAVE TO BE ACTIVATED to preset the Wake-Up Alarm, which may be performed at any time during the normal clock operation (if Stopwatch or other programmable timers are Not Enabled).

1. Press the SET key to initiate the WAKE-UP ALARM Preset Mode.
2. Using the UP and DN keys preset the Alarm HOURS and MINUTES.
Use the NXT key to move from minutes to hours and back.
NOTE: To reset the time to 0:00 press the CLR key.
3. When finished, wait for several seconds without pressing any keys. The clock will resume normal operation and a DOT in the lower-right corner of the display will begin to flash. This is an indication that the Alarm is preset and active.
4. TO CANCEL the Wake-Up Alarm, press the STOP key at any time during the normal clock operation.
The lower-right decimal point will be switched off in response.

NOTE that the Wake-Up Alarm may be activated at any time during the normal clock operation by pressing the SET key.
If the preset Alarm Time is satisfactory, wait for few seconds for the display to return to the regular operation mode. Slow flashing of the lower-right decimal point will indicate that the alarm is activated.

IMPORTANT.
Whenever the function Fn 39 is enabled, the WAKE-UP ALARM will be automatically deactivated until Fn 39 is disabled again. However, the Wake-Up Alarm preset time will remain unchanged in the memory.

TO SILENCE the Wake-Up Alarm, press the MUTE key at any time while the alarm buzzer is sounding. The Buzzer will be silenced and the Alarm deactivated.

In order to reactivate the alarm for the next day, press the SET key as described previously.

The Soft Wake-Up Alarm Buzzer active period is limited to 4 minutes unless silenced or cancelled sooner.

UP/DOWN STOPWATCH TIMER and EVENT COUNTER

SELENA can be used to function as a presettable UP/DOWN STOPWATCH TIMER AND EVENT COUNTER with an Alarm Buzzer and / or Internal Relay Control.

To enable the UP/DOWN STOPWATCH TIMER mode, make sure that the function Fn 39 is ENABLED.

For the Up/Down Event Counter mode, the function Fn 31 MUST also be enabled.

Possible timer/stopwatch formats:

A) In 4-digit display format (Fn 9 disabled)
   1. MINUTES : SECONDS format when function Fn 38 is enabled.
   2. HOURS : MINUTES format when function Fn 38 is disabled.
   3. SECONDS : 1/100 SEC format when function Fn 38 is enabled and Fn 35 enabled.

B) In 6-digit display format (Fn 9 enabled)
   1. HOURS : MINUTES : SECONDS format when function Fn 38 is disabled.
   2. MINUTES : SECONDS : 1/100 SEC format when function Fn 38 is enabled and Fn 35 enabled.

NOTE that even in the 6-digit display models the 4-digit format may be selected (Fn 9 disabled) if necessary.

C) In models with TEXT display (Fn 85 enabled)

   Fn 72     HH-MM-SS hh (timer or counter) (also see Fn 35,36,38,39,)
   Fn 73     Tmr MM-SS (timer) (also see Fn 35,36,38,39,)
   Fn 74     TIMER HH-MM (timer or counter) (also see Fn 35,36,38,39,)

ATTENTION: In ALL TIMER MODES with 4-digit display and when the MINUTES:SECONDS display format (Fn 38) is NOT SELECTED, the following will occur:
   During the FIRST hour of the count UP or the LAST hour of the count DOWN, the display of Hours:Minutes will switch automatically to Minutes:Seconds to allow the user to monitor the time with better accuracy.

NOTE, that the programming mode DOES NOT HAVE TO BE ACTIVATED to preset the Up/Down Timer/Counter, and it may be performed at any time while in the regular clock operation.

To Preset the COUNT UP/DOWN STOPWATCH TIMER or EVENT COUNTER:

NOTE: If the function Fn 87 is NOT ENABLED, the Count-Down operation of the Timer is selected by presetting the START TIME as different than 00:00(.00). Otherwise it will function as a Count-Up Timer. The Event counter can count Up or Down independent of the preset but will not go DOWN past the 000000 count (unless the function Fn28 for the "looping" timer is enabled).

1. Press the SET key to initiate UP/DOWN TIMER/COUNTER Preset Mode.
   NOTE, that the display will automatically switch to the Timer/Counter Mode and will show the last preset.

2. Using the UP and DN keys, preset the Timer HOURS and MINUTES (or Counter Initial count) or leave it unchanged.
   Use the NXT key to move from minutes to hours or seconds (or count digits) and back if necessary.
   NOTE: To reset the time/count to 00:00 (:00) press the CLR key.

3. When finished, wait for several seconds without pressing any keys. The clock will resume the normal operation.
To START the COUNT-DOWN STOPWATCH TIMER or COUNTER:

NOTE: When the TIMER PRESET is different than 00:00.00 and the Fn 87 is Disabled, the timer will operate in the COUNT-DOWN mode.

1. Press the STRT key at any time during normal clock operation. In the Event Counter mode, press DN key.
2. The previously preset start time/count will be automatically loaded in and the Timer will begin the Count Down.
3. To HALT the timer press STOP key. The count-down will be halted (suspended). No effect in Event Counter mode.
4. To Resume the timer press the STRT key. The count-down will be resumed. No effect in Event Counter mode.
5. When the Time or the Count 00:00.00 is reached, the timer will stop. Alarm Buzzer (if enabled by Fn 17) will sound and the Alarm Relay will operate (as selected by functions Fn 18 and Fn 37).
6. To RESET the Timer/Counter at any time press the SET key. To reset the relay in the Counter mode the CLR key may also be used.
7. To RESET the Timer/Counter after the count-down has finished, press the CLR key.

NOTE:
The clock DOES NOT have to remain in the Timer Display mode to continue the Up/Down Timer operation. During the Count-Down a DOT in the lower-right corner of the display will be rapidly flashing if the display is in the Real Time Display mode. If it is in the Timer Display mode, the Colon Dots will flash rapidly instead. This is an indication that the TIMER is operating. In the HALT timer mode the colon will flash rapidly pausing every several seconds.

To START the COUNT-UP STOPWATCH TIMER or COUNTER with 00:00 preset:

NOTE: When Fn 87 is NOT enabled and the TIMER PRESET is 00:00.00, the Timer will operate in the COUNT-UP mode.

1. Press the STRT key at any time during normal clock operation. In the Event Counter mode, press the UP key.
2. The preset 00:00.00 time will be automatically loaded in and the Timer will begin the Count Up.
3. To HALT the timer press the STOP key. The count-up will be halted (suspended). No effect in Event Counter mode.
4. To Resume the timer press the STRT key again. The count-up will be resumed. No effect in Event Counter mode.
5. To RESET the Timer/Counter at any time press the SET key.

To START the COUNT-UP STOPWATCH TIMER or COUNTER with ANY preset:

NOTE:
When Fn 87 is enabled, the TIMER may be PRESET to ANY value within the timer range. the Timer will operate in the COUNT-UP mode and will stop at the preset value. Each time the START is activated, the timer will jump to 00:00 and continue counting up to the preset value.

To set up this timer, follow the procedure for operation of the Count-Down timer/counter.

NOTE:
The Alarm Buzzer and the Internal Relay can be controlled by the Timer while in the Count-Up mode only if Fn 17 is also enabled. Also see the function Fn 49 for how to set the short time Buzzer or internal relay ON period.

2. The clock DOES NOT have to remain in the Timer Display mode to continue the Up/Down Timer operation. During counting a DOT in the lower-right corner of the display will be rapidly flashing if the display is in the Real Time Display mode. If it is in the Timer Display mode, the Colon Dots will flash rapidly instead. This is an indication that the TIMER is operating. In the HALT mode the colon will flash rapidly pausing every several seconds. Note, that when the clock is a part of a synchronized Master-Slave network, the flashing colon or flashing dot feature for timers may not function the same way.
CYCLING (LOOPING) UP/DOWN STOPWATCH TIMER (automatic Reset and Restart)

This function may be used either with the remote control or when the external inputs for Start, Stop, Reset are installed (see Fn 36).

By enabling the function Fn 28, the timer may be set to the LOOPING mode of operation. In this mode, once STARTed, the timer/stopwatch will continue counting down (or UP if the function Fn 87 is also enabled), until it reaches 00:00 in the countdown mode or the PRESET value in the count-up mode. At this point it will reset itself to the starting value and continue counting. This process can be interrupted at any time by activating the STOP or SET (RESET) key (or external input).

NOTE: that in this mode the internal buzzer and/or relay CAN also be controlled by the timer. See the functions Fn 17, 37, 49. At each “expiry” of the timer, the internal buzzer (Fn17) and/or the internal relay (Fn 37) may be enabled to become active for a short period (3 to 5 seconds when Fn 49 is also enabled) or until the MUTE or the SET key is pressed on the remote (or until the external RESET input is activated).
Please note, that when the remote control is used to operate the timer or when Fn 58 is enabled and the external START/STOP/RESET inputs are used, the timer can be “HALTed” at any point and then restarted.

UP/DOWN TIMER RECOVERY after Power Failure
(Optional Feature)

When the function Fn 43 is Enabled, the Up/Down timer can recover the lost time and continue counting as if the power was present all the time.
When the function Fn 42 is also Enabled, the lost time will not be taken into account and the timer will restart in the HALT mode after the power returns. To continue counting, press the STRT key on the remote (or activate the external START input).
This option may not be available on standard clock models unless specifically ordered.

1/100 SECOND RESOLUTION for UP TIMER/STOPWATCH
(Optional Feature)

Enable the function Fn 35.
Note, that this option may be used either in 4-digit or in 6 digit displays, however to show Sec:1/100 sec in the 4-digit display the function Fn 38 must also be enabled.

NOTE: The 1/100 stopwatch can be operated via the remote control when the function Fn 36 and Fn 59 are also enabled. However, the 1/100 sec timer function should be used when the external inputs for Start, Stop, Reset are installed (and Fn 36 enabled), since the speed of reaction to the STRT or STOP key on the remote is not determined and may not be predictable in the 1/100 sec resolution.

AUTO-RESTART for UP TIMER / STOPWATCH
(Optional Feature)

This function may be used only when the external inputs for Start, Stop, Reset are installed (Optional Feature).

Enable the functions Fn 36 and Fn 57.

NOTE: The 1/100 second resolution mode may also be activated by enabling the function Fn 35.

In the Auto-restart mode, the timer will start counting UP when the START input is activated and will automatically STOP and RESTART each time the START input is reactivated. At each RESTART, the display will show the “most recent count” between the two starts. Activating the STOP input will stop the timer permanently until the START input is activated again.

The Auto-restart mode can be used to “measure” the time periods between periodically occurring events (the START input activations).

SWITCHING THE DISPLAY BETWEEN THE TIMER AND THE REAL TIME CLOCK

1) If using the remote to control the timer:

After finished using the timer, press the "SCAN" key on the remote.
The clock will go to the real time clock display mode or any other mode set by any of the functions Fn 0 to Fn 6.
If the timer is to be used again, press any of the SET, STRT, or STOP keys.

NOTE, that if the SCAN key is pressed while the timer is still running and the real time clock is displayed, the DOT in the lower
right corner of the display will be flashing to indicate that the timer is running in the background. To see the timer then, press the STRT key (or SET or STOP key) on the remote.

2) If using the external Start/Stop/Reset inputs for the timer:

After finished using the timer, press the "SCAN" key on the remote or activate the external RESET input and hold it for 5 seconds. In both cases the display will go back to the real time clock display mode.

OTHER possible MODES:
Depending upon the desired operation, the clock may be set to alternate between the timer and the real time clock display, even if the timer is not presently running.
To do that, enable the function Fn 7 and have the function Fn 3 also enabled (default).
Generally, the first 8 functions (Fn 0 to Fn 7) control what the display will show in the alternating mode. The timer display screen is Fn 7.
However, the timer display can be initiated at any time even if Fn 7 is not enabled, as described above, by pressing any of the timer keys on the remote or activating any of the timer external inputs (Start/Stop/Reset).
If the display is set to alternate, pressing the HOLD key at any time, will stop the alternating mode.
To resume the alternating press the SCAN key.
This way, even if several screens are alternating, like: time, timer, date, temperatures (if installed), Julian day (if installed), it is possible to FREEZE the particular screen by pressing the HOLD key while the desired screen is on the display.

EXTERNAL START / STOP / RESET INPUTS
FOR UP / DOWN TIMER / STOPWATCH and EVENT COUNTER
(Optional Feature)

The SELENA timers and event counters may be set up to use external inputs for Start, Stop (count UP, count DOWN) and Reset. These inputs are available via the screw terminal block accessible at the back panel (if installed).

To activate the External Inputs for the Up/Down Timer/Stopwatch or Event Counter, enable the function Fn 36.

CAUTION: External inputs may be connected to DRY CONTACTS ONLY. Any voltage carrying signals connected to those inputs may cause irreversible damage. However, in special applications it is possible to apply a voltage within the range from 0 to +5V between the Common (0V) and any of the external control inputs if an external current limiting resistor is also used.

NOTE: If the function Fn 59 is also enabled, the timer may be operated via the remote concurrently with the external inputs.

The Timer activated via the external inputs behaves in a similar fashion as when it is operated using the Remote Control unit. However, note the following:

1. The Timer or Counter initial count may be preset only via the remote control (by pressing the SET key).
2. A) If the Function Fn 58 is NOT ENABLED, activating the START input will start the timer only if it was previously RESET either by activating the external RESET input, or via the remote control, by pressing the SET or CLR key. In the Event Counter mode (Fn 31), the count will be incremented by 1.
STANDARD OPTION
WIRING OF EXTERNAL DRY CONTACT SWITCHES FOR TIMER/COUNTER OPERATION WITH THE STOP INPUT OPERATING AS THE TIMER / COUNTER ENABLE / DISABLE (NORMALLY ENABLED)

OPEN = COUNT ENABLED
CLOSED = COUNT DISABLED

RESET JUMPER

STANDARD OPTION
WIRING OF EXTERNAL DRY CONTACT SWITCHES FOR TIMER/COUNTER OPERATION WITH THE START INPUT OPERATING AS THE TIMER / COUNTER START / STOP (Fn 69)

CLOSED = COUNT ENABLED
OPEN = COUNT DISABLED

SPECIAL OPTION
WIRING OF EXTERNAL DRY CONTACT SWITCHES FOR TIMER/COUNTER OPERATION WITH THE STOP INPUT OPERATING AS THE TIMER / COUNTER ENABLE / DISABLE (NORMALLY DISABLED)
B) If the Function \( \text{Fn 58} \) is **ENABLED**, activating the START input will start or restart the timer only if the STOP (HALT) input is NOT activated.

In the Event Counter mode (\( \text{Fn 31} \)), activating the UP input will increment the count by 1.

3. **A)** If the Function \( \text{Fn 58} \) is **NOT ENABLED**, activating the STOP input will stop the timer and it may only be restarted from the beginning after activating the RESET input or pressing the SET or CLR key on the remote.

**B)** If the Function \( \text{Fn 58} \) is **ENABLED**, activating the STOP (HALT) input will “halt” the timer.

**C)** If the Function \( \text{Fn 58} \) is **ENABLED**, and the START input is permanently activated, then the STOP (HALT) external input may be used as the “DISABLE” for the timer for as long as this input remains activated.

In the Event Counter mode (\( \text{Fn 31} \)), activating the DN input will decrement the count by 1.

**NOTE:** If the internal buzzer is enabled (\( \text{Fn 17} \)) it will be activated whenever the count reaches 0000 while counting down. The MUTE key or the SET key on the remote, or the external RESET input may also be used to silence the buzzer (or reset the internal relay).

4. If the Function \( \text{Fn 7} \) is not set as the exclusive display screen mode, pressing the STRT, STOP or SET key on the remote will bring the Timer display on screen. Similarly, activating the external RESET input will have the same effect.

5. When the External Inputs are enabled (by enabling the function \( \text{Fn 36} \)), only the SET key on the remote may activate the timer or counter preset. The STRT and STOP keys on the remote are not operational in this mode **unless** the function \( \text{Fn 59} \) is also enabled, in which case the CLR key may also be used to reset the timer.

6. When the External Inputs are enabled (by enabling the function \( \text{Fn 36} \)) and the function \( \text{Fn 68} \) is also enabled, the external START can START/RESET and can also STOP the timer. The external STOP and RESET inputs do not have to be used.

7. When the External Inputs are enabled (by enabling the function \( \text{Fn 36} \)) and the function \( \text{Fn 69} \) is also enabled, the external START can START/STOP the timer. The external STOP input does not have to be used. The external RESET input still has to be used to RESET the timer.

### PROGRAMMABLE MULTI-EVENT TIMER

**(Optional Feature)**

The Programmable multi-event timer modes allow for presetting of the time instances (hours and minutes of the day for each day of the week) at which the internal buzzer and/or internal relay(s) may be activated in order to control the operation of some external devices and/or sounding an Alarm.

The duration of each event is also individually programmable. There may be **up to 32 events per day** and each day of the week may be programmed with a different schedule.

The programmable multi-event timer is selected by enabling the function \( \text{Fn 48} \).

Each event time occurrence and event duration period (alarm period) may be programmed. In addition, each event can be marked to perform an OPTIONAL activation of a COUNT-UP or COUNT-DOWN timer that will run and display until the next event.

All programmed data is stored in the internal, permanent memory which is retained even without the supply power.

Up to two optional, **internal** relays may be ordered with most clock models. They are designated as Relay 1 and Relay 2.

In most applications only Relay 1 is needed in order to control an external load like for instance a siren / buzzer or a light. During the programming of each event, the “duration time” may be set from 0 up to 58 seconds, or until the next event. During that period the internal Relay 1 will also be energized if the function \( \text{Fn 37} \) is enabled.

The Relay 2, if installed, may be controlled by programming the “option number” \( (\text{OP zz}) \) for each event.

In most models, both the Relay 1 and 2 have SPDT contacts accessible at the terminal block on the back panel of the clock. The standard switching capabilities of these contacts are 10Amp, 250V max.

### HOW TO PROGRAM THE MULTI-EVENT TIMER

Programming of the Multi-Event Timer is performed using either the wireless IR Remote Control included with all clocks or the optional, wired Remote Control unit.

The Multi-Event Timer may be programmed at any time during the regular clock operation and **DOES NOT** require invoking of the Clock Programming Mode.
1. Press the SET key at any time during the normal clock operation. The display will show the Weekday and the Event number for that day.

2. The Event number will flash rapidly to indicate that it is active for selection. Use the UP and DN keys to select the event number for that day.

3. To move the cursor to the Weekdays press the NXT key. Use the UP and DN keys to select the day and press the NXT key. The display will show: du:xx (or: dxxx) where “xx” (or “xxx”) is the Alarm duration period in seconds ( 0 to 59 ) for the event being programmed. NOTE that when the duration is set to 59 seconds, the Relay 1 (if enabled by function Fn37) and/or the internal buzzer (if enabled by function Fn17) will remain energized until the next occurring, valid event with the duration programmed as different than 59 seconds.

4. Using the UP and DN keys, set the required Alarm duration period in seconds. When satisfied, press the NXT key.

5. The display will show the hour and the minute (HH:MM) of the event that day. Using the UP and DN keys preset the required time of the event. To move the cursor press the NXT key.

6. The display will show: OP zz, where “zz” is an additional option that can be activated at the time of the event. This option allows to cause the display to show a running UP or DOWN timer that is automatically programmed with a time period equal to the time difference between the CURRENT and the NEXT valid event. Depending upon the selected option number, the event may cause the internal Relay 2 (if installed) to be activated as well. In such case the Relay 2 will remain energized until the next valid event. The Relay 2 contacts are accessible at the back panel of the clock.

7. NOTE that in the 4 digit clocks the timer Count-Up or Count-Down format may be in Hrs:Min or Min:Sec depending upon the setting of the function Fn 38. Also, if the Hrs:Min format is selected, the timer display will switch automatically to Min:Sec whenever the current timer reading is under 1 hour.

Using the UP and DN keys select the required option for the event. The available options are as follows:

- Option “00” = sets this entire event as NOT VALID (this event will be skipped by the timer routine).
- Option “01” = no options to perform.
- Option “02” = activate the count DOWN timer automatically to count DOWN the time until the next event and DO NOT energize internal Relay 2.
- Option “03” = activate the count UP timer automatically to count UP the time until the next event and DO NOT energize internal Relay 2.
- Option “04” = activate the count DOWN timer automatically to count DOWN the time until the next event and ENERGIZE internal Relay 2.
- Option “05” = activate the count UP timer automatically to count UP the time until the next event and ENERGIZE internal Relay 2.
- Option “06” = ENERGIZE internal Relay 2 only, no timer to run.

7. When satisfied with the preset data, press the HOLD key to store the data in memory. MAKE SURE that this is done WHILE either the duration, the options or the Alarm Hours:Minutes is on the display. If it is not done so, the OLD data shall be restored in the program memory.

8. The display will flash the text: “Strd” momentarily to indicate that the Alarm data has been stored in memory.

9. Press the NXT key to go back to Step 2 in order to continue programming of other Events or

Wait a few seconds for the system to return to the Normal Operating Mode. The Event Timer schedule will begin executing automatically.

Remember, that in order to assure the correct operation of the programmable timer, the real Date and Time of the clock has to be set correctly.

NOTE that the order in which the clock is searching for active alarms is from event “00” thru event “31”. The search is performed at 00 seconds of each minute of the real time. The First encountered active alarm shall be executed and further search shall be aborted until the next minute of the real time clock reading. Therefore, if more than one event for the day is identical with any other, only the younger (in order) event number shall be executed. This may have application in deactivating any unused alarm events by setting them as identical to the highest used event number for the day. However, it is a good practice to deactivate the unused events by setting their option number to 00 (OP 00).

Note, that if certain events show unrecognizable characters and/or show the event hour:minute as 55:55, these events will be ignored by the program anyway and therefore do not need to be deactivated manually.

To be able to control the Internal Relay 1 operation during the Timer Alarm periods, enable the function Fn 37 (see FUNCTION SETUP Procedure section).
To be able to control the Internal Buzzer operation during the Timer Alarm periods, enable the function Fn 17 (see FUNCTION SETUP Procedure section).

To SILENCE THE INTERNAL BUZZER ONLY without affecting the RELAY 1 during a pending Alarm, press the MUTE key.

To DISABLE THE INTERNAL BUZZER PERMANENTLY, disable the function Fn 17.

To SILENCE THE BUZZER and DEACTIVATE the ALARM RELAY 1 during a pending Alarm, press the SET key and wait a few seconds.

To DISABLE the MULTI-EVENT TIMER operation:
disable the Multi-Event Timer function Fn 48 (see FUNCTION SETUP Procedure section). All previously preset events data will be retained in the memory unaffected.

For instructions on how to connect external loads to the Internal Alarm Relays contacts, see the section: “INTERNAL CONTROL RELAY Wiring”.

INTERNAL CONTROL RELAY
(Optional Feature)

The internal control Relay 1 is enabled by enabling the function Fn 37.
The Relay 2 is enabled by specific applications.
The Presettable Stopwatch/Timer/Counter, Programmable Thermostat, Programmable Multi-Event Timer and Temperature HIGH/LOW ALARM can activate ONE or TWO internal Control Relays that can be used to switch external loads up to 10Amp/240VAC. Both of the Internal Relays have SPDT contacts available, but may not be accessible to the user in some models. For instance, in the Programmable Thermostat mode, only either the Normally Open or Normally Closed SPST contacts are usually wired from both internal relays. Ask for the specific access to the relays contacts when ordering.

NOTE, that in the Stopwatch/Timer/Counter applications, if the function Fn 49 is enabled, the internal relay 1 will remain active only for a 3 seconds period.

INTERNAL CONTROL RELAY Wiring

Make sure that all power is disconnected.

1. Locate the Relay Contacts screw terminal block on the back panel of the enclosure.

A) Internal Relay Only installed:

B) Internal SPDT Relay and Internal DC Power Source:

NOTE: Normally the internal DC voltage is filtered but NOT regulated and may vary from appx. 11V to 16VDC.

2. Attach the load wiring to the terminal and secure it with the terminal screws.

NOTE: The wiring should be of sufficient gauge to carry the load current and insulation should be appropriate for the load voltage. Remember to provide adequate fuse protection.
INTERNAL CONTROL RELAY in COUNT UP / DOWN TIMER / COUNTER ALARM application

The Internal Relay can be controlled by the Count UP or DOWN Stopwatch/Timer/Counter ONLY when the Function Fn 37 is ENABLED.

Several control modes of the Internal Relay are possible depending upon the settings of the functions Fn 16, 18 and Fn 49.

1A. When Fn 18 is Enabled and Fn 16 Disabled, the Internal relay will be switched OFF in response to the Count Up or Down Timer/Counter Expiration (ALARM) or when the Timer/Counter is not running. It will be switched ON while the Timer/Counter is running.

1B. When Fn 18 is Enabled and Fn 16 Enabled, the Internal relay will be switched ON while the Timer/Counter is running. It will remain switched ON until either the SET key or the CLR key is pressed, or the external RESET input is activated.

2. When Fn 18 is Disabled and Fn 16 Disabled, the Internal relay will be switched ON in response to the Count Up or Down Timer/Counter Expiration (ALARM) and will remain NORMALLY switched OFF in all other conditions.

3. When Fn 49 is Enabled, the Internal relay will be switched ON in response to the Count Up or Down Timer/Counter Expiration (ALARM) only for a period of 3 seconds and will remain NORMALLY switched OFF in all other conditions.

In all of the above modes, to Reset the Internal Relay to the OFF state and to Reset the Timer/Counter, press the SET key or the CLR key, or activate the external RESET input (if installed).

EXTERNAL ALARM SIREN / BUZZER Wiring

The two wiring examples below show how to connect the external Siren or Buzzer to the internal control relay contacts. This setup may be used with the Multi-Event Programmable timer functions or the Programmable UP or DOWN timer/stopwatch.

INTERNAL ALARM BUZZER Operation

The internal Alarm Buzzer is always operational if the clock is in the WAKE-UP ALARM Clock mode (Fn 39 disabled).

In ALL OTHER modes the Internal Alarm Buzzer operates only if the Function Fn 17 is enabled. The Buzzer will sound in an
ON/OFF fashion for as long as the Alarm Conditions exist. Also see the function Fn 49 for how to set the short time Buzzer or Relay ON period.

The Internal Alarm Buzzer may be SILENCED at any time by pressing the MUTE key or the SET key and it will remain silent until the present alarm is reset manually or automatically and a new alarm occurs.

NOTE 1: In the Programmable Multi-Event Timer modes, the Buzzer will sound ( if enabled by Fn 17 ) and/or the internal relay will be energized for as long as it is programmed to do so.

NOTE 2: In the “Cycling” Timer modes the Buzzer will sound and/or the internal relay will be energized for a period as selected by enabling/disabling the functions: Fn17, Fn18, Fn28, Fn37, Fn49 and Fn87.
MASTER - SLAVE SYNCHRONIZED SYSTEM CLOCK NETWORKS

A group of SELENA clocks may be installed as SLAVES and a MASTER in a Synchronized Master - Slave System utilizing one of the following methods of communication:

1. **Power Line Carrier System** with Synchronizing signal carried by the Power Line that is also supplying the power for the clock. A dedicated Master transmitter must “inject” the sync signal into the power line.

2. **Similar as the Power Line Carrier Sync** protocol only the Sync signal may be either a dedicated wire with High Voltage (usually same as the line voltage) or a Low Voltage (5V to 35V AC/DC) signal.

3. **Serial Communication via the Power Line** usually at 300 or 600 Baud speeds. All sync communication is carried via the existing Power Line wiring.
   A. Using the **Standard SELENA Time Sync communication protocol**
   B. Using the **ASCII Time Code Formats “0, 1, 2 or 3”**
   C. Using the **LATHEM compatible protocol ASCII Time Code**

4. **Radio Communication** via a dedicated RF Transmitter / Receiver usually at 1,200, 600 or 300 Baud speeds.
   A. Using the **Standard SELENA Time Sync communication protocol**
   B. Using the **ASCII Time Code Formats “0, 1, 2 or 3”**
   C. Using the **LATHEM compatible protocol ASCII Time Code**

5. **2-WIRE (twisted pair) Sync System** with the Synchronizing signal from the Master clock or a PC, carried by a Dedicated Cable in RS232 or RS485 compatible standard with a low voltage sync signal connected to each slave clock in the network.
   A. Using the **Standard SELENA Time Sync communication protocol**
   B. Using the **ASCII Time Code Formats “0, 1, 2 or 3”**
   C. Using the **LATHEM compatible protocol ASCII Time Code**

6. **MINUTE IMPULSE Sync** System for 2-wire, 3-wire and Reverse Polarity 1 Minute and 1/2 Minute Impulse

7. **BCD Time Code** (Simplex compatible) for 50 and 60 Hz clock speed.

8. **Multi-zone Clock System**

9. **Custom** RS-232 or RS-485 compatible communication network at 9600, 1,200(or 4800), 600 or 300 Baud speeds.

See the following sections for the description of each of the above sync systems.

**POWER LINE CARRIER Synchronizing signal (Fn 23 enabled)**

( Optional Feature )

Large System Clock installations may be synchronized by injecting a strong, low frequency signal into the power line at certain times of the day. The Slave Clocks receive that signal and self-adjust their internal circuitry in order to remain “IN-SYNC” with the Master clock and all other clocks in the system.

Two distinctive types of sync signals are sent with a different purpose:

1. **12 HOUR Sync Mode ( disable Fn 14 )**
   Sent from 57th minute 54th second to 58th minute 02 seconds of every hour except at 05:57.54 and 17:57.54 when the signal lasts until 58th minute 08 seconds.

2. **24 HOUR Sync Mode ( enable Fn 14 )**
   Sent from 57th minute 54th second to 58th minute 02 seconds of every hour except at 05:57.54 when the signal lasts until 58th minute 08 seconds.

Each clock may be setup to respond to ANY SELECTED sync signal frequency within the range of the clock model. Normally this range will be from 2,000 Hz up to 16,000 Hz.

To select a particular Sync Frequency perform the following:

1. Make sure that functions Fn23, Fn 31, 38, 39 and Fn 11 are Enabled.

2. Press the “SET” key on the Remote and select the frequency in multiples of 10x by pressing the “UP” and “DN” keys. For instance to setup 2925 Hz select the number: 292.

3. When the digits stop flashing, press the “SCAN” key to return to the regular time display.
RS-485 COMMUNICATION CABLE (2 COND.) SHIELDING OPTIONAL

TO MORE SLAVES

Observe the conductor polarity while wiring to the terminals

PC USED AS THE MASTER WITH TWISTED PAIR (RS-485) SYNC COMMUNICATION WIRING ALLOWING FOR LARGE NUMBER OF SLAVES OVER LONG WIRING DISTANCES.

RS-232 (PC) to RS-485 CONVERTER (option # 901)

RS-485 COMMUNICATION CABLE (2 COND.) SHIELDING OPTIONAL

TO MORE SLAVES

Observe the conductor polarity while wiring to the terminals

PC USED AS THE MASTER WITH SERIAL RS-232 SYNC COMMUNICATION WIRING ALLOWING FOR SMALL NUMBER OF SLAVES OVER SHORT OR MEDIUM WIRING DISTANCES.

RS-232 or USB (PC) SERIAL PORT

RS-232 or USB (PC) SERIAL PORT

PC WITH RS-232 or USB PORT AND INSTALLED “PC2KERA” DRIVER S/W (option # 721)
GENERAL MASTER—SLAVE SYSTEM
WITH SELENA OR OTHER MASTER CLOCK, OR A PC USED AS THE MASTER.

RS485, RS232 OR OTHER SYNC COMMUNICATION WIRING AND
THE OPTIONAL OPTO-REPEATER MAY BE USED TO BOOST THE COMMUNICATION SIGNAL.
4. After the frequency selection has been made, the functions Fn 31 and Fn 11 may be disabled or left enabled.

**IMPORTANT:** The Sync signal Frequency programming affects the current Stopwatch/Timer/Counter memory. Therefore, if timers or counters are also being used, **DISABLE** the function Fn11 and renew the programmed starting time / count after finishing the zone offset programming. If the timer, not the counter is to be used, also **DISABLE** the function Fn31.

**NOTE1:** It is possible to monitor the presence of the Sync signal detected by the Slave Clock by enabling the function Fn12. When Fn12 is enabled, the colon in the time clock display will flash when the sync signal is present.

**NOTE2:** In systems with the **WIRED** Impulse Sync transmitted through a separate Cable, High Voltage or Low Voltage, the operation is similar except the **Signal Frequency selection is NOT NECESSARY** and the function Fn 13 must be also enabled. The sync signal should then be connected to a pair of designated terminals on the back panel of the clock.

**MASTER—SLAVE Sync System with Serial Communication**

( **Optional Feature** )

Large System Clock installations may be synchronized by linking them together in a serial communication network using a "Twisted Pair" 2-conductor cable, power line serial communication, Ethernet/Internet or **RF (radio) communication**. Slave Clocks receive the data transmitted by the Master Clock (SELENA or other) or a PC and interpret that data to synchronize themselves with the Master.

In the simplest system the basic configurations for the **Master-Slave** operation are as follows:

1. **SLAVE** for **TIME SYNC** only
   ( **for all protocols** )
   The slaves will interpret the Time data from the Master and will set its own internal clock “in sync” with it. In these configurations, even if the data connection is lost, the Slaves will continue accurate timekeeping based on the latest, successful sync data reception.

   A. To use the standard **SELENA Time Sync communication protocol** enable the appropriate functions as listed in the **Configuration Table** below.
   B. To use the **ASCII Time Code Format "0,1,2 or 3" or Latham protocol** enable both Fn 34 and Fn 46 and select the sync format by enabling Fn11 and Fn12 as required.

2. **SLAVE** as the **DISPLAY REPEATER** form the MASTER clock screen ( **This option is allowed only** when the **SELENA Time Sync protocol** is used ). See the function Fn 33.
   The Slave will repeat all the display data as transmitted by the Master. In this configuration the Slave will not be able to perform any other display functions except when it is put in the programming mode via the Remote Control. In case of a loss of communication, the slave display may "freeze" at the last received screen.

   The function Fn33 may be used in Special Applications as the Master display contents repeater for broadcasting to the slaves. This may work **ONLY** with the SELENA Time Sync protocol.
   When other communication protocols are enabled, the clock may automatically **DISABLE** the **Fn 33 Display Repeater Mode**.

3. **EXTRA DATA TRANSMISSION** from the MASTER or from designated Slaves
   ( **This option is allowed only when the SELENA Time Sync protocol** is used ).
   See the functions Fn 81, 82, 83.
   The Master (or a PC) or in some cases the selected Slaves or Repeater slaves, may be setup to transmit special data with selected parameters or commands. For instance the temperature measurement results, the relay control or the timer setup data may be sent from the Master or the repeater to some slaves that are setup to receive such data.
   Appropriate control software (and hardware) and functions must be installed and enabled to use this configuration.
TO MORE SLAVES IN THE NETWORK

NOTE:
NOT ALL TERMINALS AND SIGNALS MAY BE AVAILABLE IN ALL MODELS OR CONFIGURATIONS. OTHER SYNC WIRING MODES ARE POSSIBLE.

MASTER—SLAVE SYSTEM WITH COMMUNICATION over the POWER LINE WIRING using SELENA WITH INTERNAL PLC MODEM AND A PC AS THE MASTER.
MASTER—SLAVE SYSTEM WITH COMMUNICATION over the POWER LINE WIRING using EXTERNAL PLC MODEM and a PC AS THE MASTER.

TO MORE SLAVES IN THE NETWORK

PC COMPUTER with RS232 or USB serial port and with installed PC2KERA driver S/W (option # 721)

1, 2 or 3 PHASE EXTERNAL POWER LINE MODEM WITH RS232 OR RS485 INPUT (option # 724XRS)

SLAVE CLOCKS WITH INTERNAL POWER LINE MODEMS (option # 724RS)

RS232, USB or RS485 COMMUNICATION RS-232 (PC) to RS-485 CONVERTER may be necessary (option # 901)
MASTER—SLAVE SYSTEM WITH COMMUNICATION over the POWER LINE WIRING using SELENA AS THE MASTER.
MASTER—SLAVE SYSTEM WITH RF (RADIO) COMMUNICATION using SELENA WITH INTERNAL RF MODEM and a PC AS THE MASTER.

NOTE:
NOT ALL TERMINALS AND SIGNALS MAY BE AVAILABLE IN ALL MODELS OR CONFIGURATIONS. OTHER SYNC WIRING MODES ARE POSSIBLE.
MASTER—SLAVE SYSTEM WITH RF ( RADIO ) COMMUNICATION using SELENA with INTERNAL RF MODEM AS THE MASTER.

NOTE:
NOT ALL TERMINALS AND SIGNALS MAY BE AVAILABLE IN ALL MODELS OR CONFIGURATIONS. OTHER SYNC WIRING MODES ARE POSSIBLE.
MASTER—SLAVE SYSTEM WITH RF (RADIO) COMMUNICATION using EXTERNAL RF MODEM and a PC AS THE MASTER.
Clock Configuration Table for the SELENA Time Sync protocol:

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
| SLAVE: repeats the display data from the Master clock screen, but also synchronizes its internal clock to the time data from the Master clock screen.

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
| SLAVE: synchronizes its internal clock to the time data from the Master clock screen.

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
| MASTER: transmits the data all the time at 9,600 or 1,200 (or 4,800) Baud.

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>X</td>
</tr>
</tbody>
</table>
| MASTER: transmits the data every 1 second at 600 or 300 Baud.

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>X</td>
</tr>
</tbody>
</table>
| MASTER: transmits the data all the time at 9,600 or 1,200 (or 4,800) Baud.

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>X</td>
</tr>
</tbody>
</table>
| MASTER: transmits the data at every 5th second of each 10 second period at 600 or 300 Baud.

Where: X = Don’t care

Selection of the Serial Communication speed ( Baud rate ) for all serial protocols:

<table>
<thead>
<tr>
<th>Fn89</th>
<th>Fn88</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>9,600 Baud</td>
</tr>
<tr>
<td>OFF</td>
<td>1,200 ( or 4,800 ) Baud</td>
</tr>
<tr>
<td>ON</td>
<td>600 Baud</td>
</tr>
<tr>
<td>ON</td>
<td>300 Baud</td>
</tr>
</tbody>
</table>

**2-WIRE MASTER – SLAVE SYSTEM INSTALLATION** ( RS485 or RS232 )

( Optional Feature )

A twisted pair, 2 conductor cable must be connected “IN PARALLEL” to all clocks in the system. Additional clocks may be added at any time and/or taken away from the system either by Selecting/Deselecting the appropriate Sync Control functions or physically.

Normally, up to 64 clocks (or optionally up to 400 clocks) can operate within a single communication network wiring without any additional signal boosting. It is advisable that for each 64 slaves at least one Opto-Repeater be used to amplify the signal. Such repeater is an Option # 841 in the SELENA systems and is installed inside the clock that is purchased with that option. Alternately, a third party RS485 or RS232, or other standard signal booster/repeater may be used to improve the signal quality or strength.

Clocks that are not enabled as slaves may continue to operate in the Stand Alone mode.

For the SELENA Sync Standard Protocol:
To keep the Slave clocks synchronized with the Master, setup the appropriate function as listed in the Clock Configuration Table or use the sync repeater configuration.
See the Sync Repeater function description in this manual.

**MASTER – SLAVE SYSTEM INSTALLATION** with PC as the MASTER

( Optional Feature )

A PC may be used as the MASTER for the entire clock system.
SELENA clocks do not have to be synchronized all the time. A sync signal every several hours may be sufficient to keep all clocks working within one second accuracy. Also, when the power is interrupted and later restored, SELENA clocks will continue to count the time accurately thanks to the internal battery-less (or optional Lithium battery ) backup.

All communication methods are possible to be used in a configuration with the PC as the Master as follows:

1) The PC may send the sync to an External Power Line Modem ( with RS232, RS485 or USB input ) that sends the signal to the slaves through the power line wiring. In this case the slaves have to have the Power Line Modem receiver option installed.

2) The PC Master may send the sync to the first Slave that has a compatible RS232, RS485 or USB input and then that slave will broadcast the sync signal into the power line wiring through its internal Power Line Modem. In this case the slaves have to have the Power Line Modem receiver option installed.

3) The PC may send the sync to an External RF Modem ( with RS232, RS485 or USB input ) that sends the signal to the slaves through radio. In this case the slaves have to have the RF Modem receiver option installed.

4) The PC Master may send the sync to the first Slave that has a compatible RS232, RS485 or USB input and then that slave will broadcast the sync signal through radio with its internal RF Modem. In this case the slaves have to have the RF Modem receiver option installed.
The **Master PC** may broadcast the sync signal directly into the slave network or it may send the sync to the **First Slave** that is setup as the **Sync Repeater clock** which will then broadcast the signal to other slaves and/or repeaters. Consult the particular communication protocol since not all are allowed to use the sync repeat functions.

**For the SELENA Sync Standard Protocol:**
The software driver package "PCT2Kera.exe" must be installed on the **Master PC** to allow it to send the internal PC clock data as the Master Synchronization signal to all slave clocks. The software works in background (if properly installed) and has several features that may be customized by the user. In order to have the whole system synchronized with, for example, the Atomic Clock time or a GPS Atomic Time, another widely available software package may be installed on the same PC that will allow for updating of the internal PC clock through the internet, a special WWVB (or other Time Broadcasting radio stations) receiver card, a GPS or a network, or manually.

**MASTER – SLAVE SYNC SIGNAL RANGE EXTENDER – REPEATER configuration**

*using SYNC REPEATER function Fn 53  (Optional Feature)*

In some installations the sync signal may become deteriorated due to the long distance of wiring or weakening of the RF signal in RF communication etc... In such cases SELENA clocks can be setup to extend the signal range by repeating the Master sync signal at different “Time Slots” than the original Master transmission.

The repeater function, when enabled, will cause the selected clock(s) to retransmit the sync signal at various times (channels) during each minute. NOT ALL slaves should be set up with this function enabled. Only a few slaves should have this configuration at locations where the sync signal becomes too weak for the slaves farther down the sync path.

The “Repeater” slaves must have the functions **Fn 34** and **Fn 53** enabled and the appropriate Repeater Channel selected. All other slaves in the system must have either the function **Fn 34** enabled only to receive the sync on ALL CHANNELS or the function **Fn 53** enabled only to receive the sync on the Selected Channels only.

**NOTE**, that regardless of the settings, **ALL SLAVES ALWAYS “listen”** to the sync signal on the **05th second** of each minute.

See the table below:

<table>
<thead>
<tr>
<th>Fn32</th>
<th>Fn33</th>
<th>Fn34</th>
<th>Fn53</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>X</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>X</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>X</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

Where: X = Don’t care

To select the channel “NN”, the functions **Fn54** and **Fn 55** must be enabled as follows:

<table>
<thead>
<tr>
<th>Fn 55</th>
<th>Fn 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**NOTE 1:** Remember to correctly select the **Communication Speed (Baud rate)** by enabling/disabling the appropriate combination of functions **Fn 88** and **Fn 89** in all slaves, repeaters and the Master.

**NOTE 2:** In the Master – Slave system with the **Sync Range Extenders-Repeaters** the Master MUST NOT transmit all the time or at the channels that the repeaters use themselves for retransmission.

**ASCII TIME CODE protocol**  
*(Optional Feature)*

To select the format for the ASCII Time Code protocol, **Enable the function Fn 46** and set the following functions as required:

<table>
<thead>
<tr>
<th>Fn13</th>
<th>Fn12</th>
<th>Fn11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format “0”</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Format “1”</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Format “2”</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Format “3”</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Latham Format</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

It is required that the Data Packets must be broadcast with a gap between them of at least 100 ms of no data. Otherwise the
clock will ignore the data received too soon after the previous packet. One ASCII time code packet must be broadcast by the Master once every second (in Lathem protocol once a minute), at the beginning of each second.

Data structure is shown below:
Format 0: (CR)(LF)I(^)(^)DDD(^)(^)HH:MM:SS(^)(^)DTZ=XX(CR)(LF)
Format 2: (CR)(LF)IQYY(^)(^)DDD(^)(^)HH:MM:SS.sss(^)(^)LD
Format 3: 0003(^)(^)YYYYmmdd(^)(^)HHMMSS(+/-)HdHdMdMdD#(CR)(LF)

where:
CR = Carriage Return
LF = Line Feed
I = Time Sync Status (space, ?, *)
^ = space separator
DDD = Day of Year (001 - 366)
DD = Numerical day of month (^1 - 31)
YYYY = Year (2002, 2003, 2004 etc.)
WWW = Day of Week (MON, TUE, WED..etc.)
MMM = Month (JAN, FEB, MAR..etc.)
YY = Year without century (02, 03, 04 etc.)
HH = Hours (00-23)
: = Colon separator
. = Decimal separator
+,- = positive or negative UTC offset (time difference from UTC)
# = On-Time point
MM = Minutes (00-59)
SS = Seconds (00-60)
sss = Miliseconds (000-999)
L = Leap second Indicator (Space, L)
HdHd = UTC time difference hours (00-23)
MdMd = UTC time difference minutes (00-59)
D = Daylight Savings Time indicator (S,I,D,0)
TZ = Time Zone
XX = Time Zone Switch Setting (00-23)

NOTE: To use the SELENA clock as the Master in the ASCII Time Code Format “0 or 3” enable both Fn 32 and Fn 46 and select the required Format with Functions Fn 11, Fn 12 and Fn 13.
Note, that only the Format 0 or 3 may be selected in the Master.

NOTE: ONLY ONE MASTER IS ALLOWED TO OPERATE ON THE SAME NETWORK OR A COLLISION WILL OCCUR.

A Twisted Pair cable must be connected “IN PARALLEL” to all clocks in the system. Additional clocks may be added at any time and/or taken away from the system either by Selecting/Desselecting the appropriate Sync Control functions or physically. Clocks that are not enabled as slaves may continue to operate as stand alone.

Normally, up to 64 clocks can operate within a single RS485 communication network wiring without additional signal boosting. It is advisable that for each 64 slaves one Opto-Repeater be used to amplify the signal. Such repeater is an Option #841 in SELENA systems and is normally installed inside the clock that is purchased with that option, or a third party signal booster may be installed.

MINUTE IMPULSE Sync System
for 2-wire, 3-wire and Reverse Polarity 1 Minute and 1/2 Minute Impulse
(Optional Feature)

The MINUTE IMPULSE Synchronization slave mode may be activated by enabling the Function Fn 47.

ONLY 2 WIRES, Line A is used by the SELENA clocks to achieve successful synchronizaion. SELENA clocks will respond to the Minute Pulses within the range of +5 to +35 VDC presented at the appropriate external inputs.
The current load requirement on Line A inputs are very low and are equivalent to an Input Resistance of 4.7 to 10 Kohm per input.
The functions Fn 11 and Fn 12 select the specific protocol for the Minute Pulse sync as follows:
**EXAMPLE OF WIRED MULTI-ZONE SYSTEM**

**NOTES:**

1) For Multi-Zone Type “A” the slave zones should have the function Fn 34 and also function Fn 50 enabled.

2) For Multi-Zone Type “B” the slave zones should have the function Fn 34 and also functions Fn 90 and / or Fn 91 enabled.

3) If a PC or other external reference is NOT used as the Master, one of the zones may be assigned as the SUB-MASTER by disabling Fn34 and enabling the function Fn 32.

**NOTE:** Similar configuration may be setup using any type of wire-less communication.
EXAMPLE OF A WIRED MULTI-ZONE SYSTEM WITH ZONE CLOCKS IN SEPARATE ENCLOSURES

NOTE: Similar configuration may be setup using any type of wire-less communication.
Additional Special sync Feature:
Independent of the Fn 11 and Fn 12 settings, the functions Fn 23 and Fn 13 may also be enabled. This will cause the Selena clock to respond to a Positive Sync signal presented on a separate low or high voltage input. The protocol will be similar as in the Power Line Carrier Sync mode (see Power Line Carrier sync description), except that a Positive DC Signal or an AC signal (50/60Hz) is used rather than a specific Frequency. This may allow the user to independently sync all Selena clocks in the network to the closest hour (58th minute) and/or to 5:58 if the function Fn 14 is enabled and also to 17:58 if Fn 14 is not enabled.

NOTE, that the above feature is optional and requires that the appropriate signal inputs be installed on the clock back panel. Specify the required features when ordering.

BCD Time Code synchronization Slave / Receiver (SIMPLEX compatible)
(Optional Feature)

The BCD Time Code Synchronization slave mode may be activated by enabling the Function Fn 21. SELENA clocks will respond to the signal within the range of +5 to +35 VDC presented at the appropriate inputs. The current load requirements are very low and are equivalent to an Input Resistance of 4.7 to 10 Kohm. The input is electrically isolated from all internal electronics via high isolation opto-coupler that can withstand high voltage differences of over 1,500V.

This Sync option can receive BCD Time Code at either 50Hz or 60Hz clock speed and it detects the correct clock automatically.

MULTI-ZONE Clock Systems
(Optional Feature)

The SELENA Multi-Zone clock (V25 and later) configurations are based on the ability of the clocks to be synchronized to the Second only or the Minute-Units only or to an absolute time hours and minutes Offset. All methods allow the zones to differ by as little as 1 minute from each other. The internal timekeeping by each zone clock allows it to display the zone time and the zone date as well. In clocks with the TEXT display, the ZONE names as well as the zone dates may be stored and displayed electronically and they may be made to alternate between several different screens per each zone (see Fn 64, 65, 66, 80, 85, 86). The ZONE Master clock and each of the ZONE Slave clocks in the Multi-zone configuration should be setup separately with the zone time and date or the zone offset. Each zone can be setup to any time and/or date. In practice, the Master is usually set to the GMT (or UTC) or the Local time / date. An external Master clock may be used to synchronize the entire system with, for instance, the Atomic clock time or the building network time. This external Master may be a PC or any other Master clock that has a compatible serial data output.

NOTE: To prevent unauthorized access to the clock programming, the function Fn 62 may be enabled. ALL COMMUNICATION with the clock via the remote control is then DISABLED. To regain the remote control access remove the power momentarily and disable Fn 62 within the first 33 seconds. Similarly, the function Fn 63 can be used to Partly Disable the access via the remote control. Here, only a limited timer and dimming operation will be allowed.

NOTE: that the above functions may be also used when setting up the time zones to prevent the master or other zones from being altered accidently while operating the remote control. Usually however, one clock at a time only should be powered up when redefining the zone clocks settings or, when several multi-zone clocks are housed in the same enclosure, a dedicated switch on the side of the enclosure will allow to select the zone that is to communicate with the remote control.

There are two possible configurations that may be used in the Multi-Zone system:

NOTE: The DEDICATED MULTI-ZONE NETWORK with the Seconds SYNC FUNCTION Enabled (Fn 50, Fn 51) Option # 741 has been discontinued in Firmware Versions 25 and higher.

Type “A” MULTI-ZONE NETWORK with ABSOLUTE ZONE OFFSET (Fn 50)
This configuration requires at least one of the following wired or wire-less serial communication options installed:
# 725, 725RF, 725ETH, 725NTP, 725GPS, 725232, 724RS.
This configuration may be used either when the individual zone clocks are installed in separate enclosures or when a group of zone clocks is installed in a common enclosure.

One of the zone clocks (in the group), that has the required options installed, may be designated as the Master. Alternately, an external Master or a PC with installed Master-Slave driver software may be used. All other zone slaves must have a serial sync signal inputs installed and have the slave function (mostly Fn34) enabled. The sync signal may be transmitted by the master at any time and at any intervals. The slave zones time offsets can be set to differ even by as little as 1 minute from the master time.

Once in the Programming Mode, the multi-zone (Fn 50) function and the Zone Slave function (Fn 34) should be enabled and the ZONE OFFSET should be initially programmed manually in all zone slaves.

**TO SET THE ZONES OFFSETS**

1. Use the switch on the side of the enclosure to select the zone (if multi-zone system in a common enclosure).
2. Initiate the functions programming mode (see the manual).
3. Make sure that the zone is set as SLAVE (Fn34 enabled and, if required, set the appropriate combination of functions Fn53, 54 and 55).
4. Make sure that the zone has Fn50 enabled.
5. Enable Fn38, Fn39 and Fn51 (offset preset enable) and wait till the display returns to showing the clock time.
6. Press the “SET” key on the remote and using the UP and DN keys, preset the “time offset hours and minutes” for the zone. Use the “NXT” key to move the cursor.

**NOTE**, that setting the hours to less than 24 makes the zone offset negative and to over 24 hours sets a positive offset. The minutes are set as an absolute offset.

For instance: if the hours:minutes are set to 21:30 then the zone offset = [Master - (2hrs:30min)]. Setting the hours:minutes to 27:30 makes the zone offset = [Master + (3hrs:30min)].

7. Press the “SCAN” key to return the display to the clock mode.
8. Initiate the functions programming mode again and Disable Fn51 (zone offset programming enable).

**IMPORTANT**: The TYPE “A” Zone Offset programming affects the current Stopwatch/Timer/Counter memory. Therefore, if timers or counters are also being used, renew the programmed timer starting time or the counter count after finishing the zone offset programming.

**Type “B” STANDARD SYNCHRONIZED NETWORK with x5th MINUTE-UNITS and SECONDS SYNC FUNCTION ENABLED** (Fn 90, 91).

This configuration can be used with any of the wired or wireless options series # 725 or 724RS installed. This configuration requires that the slaves have the serial communication functions enabled, in most cases the function Fn34. The sync RANGE REPEATER functions Fn53, 54 and 55 may also be used.

When a number of clocks is synchronized using the SELENA Time Sync protocol, or in some instances also other protocols, it is possible to set the slave clocks to synchronize either “only to the Second” (enable the function Fn 90), or to the “x5th Minute-Units and the Seconds” (enable the function Fn 91), rather than the entire time data. In this configuration, some or all slave clocks should be initially set manually to different time and date, for instance different Zones.

1. Use the switch on the side of the enclosure to select the zone (if multi-zone system in a common enclosure).
2. Initiate the functions programming mode (see the manual).
3. Make sure that the zone is set as SLAVE (Fn34 enabled and, if required, set the appropriate combination of functions Fn53, 54 and 55).
4. Make sure that the zone has Fn91 or Fn90 or both functions enabled.
5. Set the clock time to the current time for the zone (see the manual) and wait till the display returns to showing the clock time.

After the first minute of operation the slaves and the master seconds will fall in sync. The minutes may sync within the first 10 minutes of operation.

Remember that in order to make the Master synchronize the zone slave clocks for the first time, it is a good practice to set the slaves (zones) seconds as close as possible to the master seconds.
However, NOTE that:

1) The SELENA Time Sync protocol, and in some instances also other protocols, MAY NOT ALLOW the slave to sync to the master signal from the 50th second of the previous till the 5th second of the next minute.

2) When Fn 91 is enabled (x5th Minute-Units sync), the slave will sync on the 5th minute of each 10-minute period only (i.e. 05th, 15th, 25th, 35th, 45th and 55th minute). The hours and the minute tens will not be affected.

3) When Fn 90 is enabled (sync the seconds only), this method will cause the zone to sync ONLY the SECONDS of each minute. The hours and minutes of the zone time will not be affected.

4) The SELENA Time Sync protocol, and in some instances also other protocols, are usually allowed to sync the slaves ONLY on the 5th second of each 10-second period except the 55th second (i.e. 05th, 15th, 25th, 35th, and 45th second).

NOTE: It may be a good practice to enable both Fn 90 and Fn 91 in the slaves to make sure that the slaves receive the sync more often than just once every 10 minutes.

IMPORTANT:

If the particular zone requires that the zone minutes are not multiples of the Master 5-minute periods, the function Fn 91 SHOULD NOT BE ENABLED. Only the function Fn 90 should be activated thus allowing the slave to sync to the SECONDS ONLY, and all minutes and hours should be initially set manually to within 1 minute of the real zone time.

Note, that in this configuration the sync RANGE REPEATER functions Fn53, 54 and 55 may also be used if necessary.

IMPORTANT: The TYPE “B” MULTI-ZONE configuration allows the slave zones to remain correctly offset from the Master Time as long as either the supply power is present or the internal backup remains charged.

TEMPERATURE MONITORING and CONTROL with ALARM
( Optional Feature )

In all temperature monitoring or control configurations the function Fn 61 must be enabled.
The functions Fn 0 and Fn 1, when enabled, will cause the display to show the temperature sensed by one or two probes.
Up to 2 temperature probes may be connected to the clock terminals (optional).
For the ease of understanding, the probes are designated as Internal and External, even though they may be both wired externally.

The clock is capable of monitoring and controlling (optional) the temperature sensed by the external and/or internal probe (use function Fn 27 to select the controlling probe). The wired sensor probe(s) can be located at a significant distance away, up to 500 feet (150 meters) or, optionally, one probe may be installed on the side of the clock enclosure.

The system also stores the historical Minimum and Maximum Temperature readings that can be displayed ON DEMAND via the remote control (by pressing the UP or DN key).

In addition, by presetting the LOW and HIGH TEMPERATURE ALARMS, the user may activate the control operation of the Internal Control Relay (if installed) and/or the Internal Alarm Buzzer to indicate the ALARM status (see Fn 29).

The temperature may be displayed in Fahrenheit units (Fn 15 disabled) or in Celsius units (Fn 15 enabled).

The temperature display resolution is normally 1F (or 1C), but in the displays with at least 6 digits it is possible to increase the resolution to 0.1F (or 0.1C). This feature is controlled by the function Fn 19.

TEMPERATURE PROBE type selection

The system can operate with two different types of NTC temperature probes specified as 50 Kohm or 100 Kohm, depending upon the setting of the function Fn 93. Enable this function only if 100 Kohm probes are installed.

Note, that the higher resistance probe responds better to higher temperatures, while the lower resistance probe is better for sensing of lower temperatures.

Temperature Test Specifications:

- Temperature Test Range: -40F (-40C) to +255F (+124C)
- Standard Resolution (Fn19 disabled): 1F or 1C
- High Resolution (Fn19 enabled): 0.1F or 0.1C
- Accuracy: +/- 1%

NOTE, that the function Fn 71 may be used to cause the system to NOT AVERAGE the temperature readings. This will result in faster reaction to the temperature changes, but at the same time, the readings may become less stable.
Temperature Probe Specifications:

<table>
<thead>
<tr>
<th>Model:</th>
<th>NA7050KB3950BRS</th>
<th>Model:</th>
<th>NA7100KB4100BLK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res. @ 25C:</td>
<td>50 Kohm</td>
<td>Res. @ 25C:</td>
<td>100 Kohm</td>
</tr>
<tr>
<td>Oper. range:</td>
<td>-40°F (-40°C) to +257°F (+125°C)</td>
<td>Oper. range:</td>
<td>-40°F (-40°C) to +302°F (+150°C)</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>+/- 1%</td>
<td>Accuracy:</td>
<td>+/- 1%</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>1” lg x 0.25” dia (25mm lg x 6.3mm dia)</td>
<td>Dimensions:</td>
<td>1” lg x 0.2” dia (25mm lg x 5mm dia)</td>
</tr>
<tr>
<td>Housing:</td>
<td>Brass</td>
<td>Housing:</td>
<td>Aluminium, black coated</td>
</tr>
<tr>
<td>Wiring:</td>
<td>24AWG, Teflon jacket</td>
<td>Wiring:</td>
<td>24AWG, Teflon jacket</td>
</tr>
</tbody>
</table>

**TEMPERATURE PROBE Installation**

Make sure that all power is disconnected.

1. Locate the External Probe screw terminals on the back panel of the enclosure.

Optional Internal and/or External Probe (or both probes) Terminals. (install 50-100 Kohm resistor if Probe not connected)

Optional Internal Probe Housing (Guard)

2. Attach one end of the Probe’s extension cable (2-conductor) to the sensor terminals and the other end to the temperature probe. The extension cable may be up to several hundred feet (meters) long.

**NOTE:** The Probe extension cable should be of low gauge to prevent the heat/cold accumulation by the large metal mass of the wire, which may cause unwanted changes of the probe temperature.

NOTE: When the “internal probe” is installed in the display housing, care should be taken to avoid unwanted transfer of the clock’s or other equipment heat/cold to the probe body, in order to prevent incorrect readings.

**Temperature Display activation**

To assure that the EXTERNAL Temperature is displayed **ALL the time**, enable the function **Fn 1** and disable all other display functions (Fn 0 and Fn 2 to Fn 7).

To select the INTERNAL probe, enable Fn 0 instead of Fn 1.

If the INTERNAL probe is to be selected as the control probe, enable Fn 27.

1. Invoke the Function Programming mode by pressing the **FUN** key after the remote programming mode has been activated (by pressing the **MUTE** key 5 times within 3 seconds or by removing the supply power for 2 seconds and...
restoring it).

2. Using the **UP** and **DN** keys, select the function number that is to be enabled or disabled.

3. Press the **NXT** key to toggle the dot in the lower, right corner of the display. When the dot is ON, the selected function is enabled. Set the functions as required for the application.

4. If necessary, using the **UP** and **DN** keys, select another function number that is to be enabled or disabled and follow the step 3.

5. When finished, wait several seconds until the display goes back to the regular operating mode.

**Temperature Control and Alarm activation**

The Temperature Alarm function is active when the function **Fn 29** is enabled. If the Alarm is to control an external load, the Internal Relay, option # 727, must also be installed.

The Temperature Control function is active when the function **Fn 30** is enabled and the Internal Relay is installed. For this function to operate the option # 713 must be installed.

To enable / disable the necessary functions, follow the steps as listed in the previous section.

**Control and Alarm Temperature programming**

1. Invoke the Data Programming mode by pressing the **NXT** key after the remote programming mode has been activated (by pressing the **MUTE** key 5 times within 3 seconds or by removing the supply power for 2 seconds and restoring it).

2. Press the **FUN** key until the display shows the present temperature reading with the flashing “C” or “F” character. If necessary, toggle between CELSIUS or FAHRENHEIT unit by pressing the **UP** or **DN** key.

3. Press the **NXT** key until the display shows the text “LoAL” and then set the desired LOW TEMPERATURE ALARM using the **UP** and **DN** keys.

4. Press the **NXT** key until the display shows the text “HiAL” and then set the desired HIGH TEMPERATURE ALARM using the **UP** and **DN** keys.

5. Wait for several seconds without pressing any keys. The clock will resume regular operation.

**NOTE:** In order to deactivate either the Low Alarm or the High Alarm, set that alarm value to the lowest (-40F) or the highest (+255F) temperature.

**NOTE:** If the temperature options are not installed, random readings may show.

**NOTE:** Whenever the display shows the text: “Prob”, one or both of the temperature probes is malfunctioning or its wiring became faulty.

**MIN / MAX TEMPERATURE MEMORY**

This function may be activated by enabling the function **Fn 20**.
External (or Internal) temperature historical Maximum and Minimum readings are saved in the internal memory and may be recalled for display via the remote control at any time.

To read the **MAXIMUM recorded Temperature** press the **UP** key.
To read the **MINIMUM recorded Temperature** press the **DN** key.

The memory contents will be displayed for appx. 4 seconds.

**To RESET either the Minimum or the Maximum temp. Memory** contents, press the **CLR** key while either the Minimum or the Maximum temperature is on the display. The respective memory will be reset to the current reading.
CONTROL RELAY Operation in LOW/HIGH TEMPERATURE ALARM application

The Internal Relay can be controlled by the Low/High Temperature Alarm ONLY when the function Fn 37 is NOT ENABLED. The Internal Control Relay operates in several different modes depending upon the setting of the function Fn 18 and Fn 16.

1. When Fn 18 is enabled, the Internal Relay will be switched OFF when the Temperature ALARM occurs and ON when there is NO ALARM condition.

2. When Fn 18 is NOT ENABLED, the Internal Relay will ONLY be switched OFF in response to the HIGH Temperature ALARM and ON when the Temperature is lower than the HIGH ALARM preset, even if it is lower than the LOW ALARM preset.

When the RELAY LATCHING is enabled (by enabling the function Fn 16), once energized, it will remain ON even if the temperature falls back within the NO-ALARM range. The relay may be reset manually by pressing the CLR key twice while the temperature is NOT in the Alarm range.

NOTE, that the internal relay installed is usually SPDT type and therefore both the Normally Open and the Normally Closed contacts are available at the terminal block.

VISUAL INDICATIONS

To change the display unit between Celsius and Fahrenheit, enable (Celsius) or disable (Fahrenheit) the function Fn 15.

A) The Display will show the INTERNAL probe temperature if the function Fn 0 is enabled.
B) The Display will show the EXTERNAL probe temperature if the function Fn 1 is enabled.

When both Fn 0 and Fn 1 are enabled, the digital display section will also show a short text designating which temperature probe test is about to be displayed. This text contents may be selected using the functions Fn 94 and 95 as follows.

<table>
<thead>
<tr>
<th>Fn 94</th>
<th>Fn 95</th>
<th>Displayed text</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>“In” and “Out”</td>
</tr>
<tr>
<td>0N</td>
<td>OFF</td>
<td>“Air” and “h2o”</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>“Air” and “Pool”</td>
</tr>
<tr>
<td>0N</td>
<td>ON</td>
<td>“Pool” and “Out”</td>
</tr>
</tbody>
</table>

Note, that both probes may be connected to the external terminal block and may be wired up to 500 feet (150 m) away from the display, using any kind of a 2-conductor cable. Optionally, a model may be ordered with one probe installed in the wall of the display enclosure.

Note, that either one or both temperatures may be enabled to be displayed in sequence alone or also with other display modes enabled by any of the functions from Fn 2 to Fn 7. When the temperature is set to alternate with any other display, it is possible to change the duration of displaying of each of the screens. This persistence is controlled by enabling or disabling the functions Fn 40 and Fn 41 as required.

In clocks with the Electronic TEXT display, the temperature may be also displayed in that section and it may be made to alternate between several different screens as well (see Fn 75, 76, 77, 85).

Wiring for ONLY Heating (or ONLY Air-Conditioning) system with one Internal SPDT Relay and with one external probe.
Fn 75   OUT  25 C  ( or 77 F )  ( also see Fn 0 , Fn 1 and Fn 15 )
Fn 76   IN  25 C  ( or 77 F )  ( also see Fn 0 , Fn 1 and Fn 15 )
Fn 77   TEMP  25 C  ( or 77 F )  ( also see Fn 0 , Fn 1 and Fn 15 , 27 )

Selecting INTERNAL or EXTERNAL probe

Either the INTERNAL or the EXTERNAL temperature PROBE may be selected for control by enabling (INTERNAL selected) or disabling (EXTERNAL selected) of the function Fn 27.
If one or both probes are not used, the probes must still be connected to the back panel screw terminals.
Alternately, a 50 kohm to 100 kohm resistor may be connected instead.

PROGRAMMABLE MULTI—EVENT HEAT / COOL THERMOSTAT
( Optional Feature )

In all temperature monitoring or control configurations the function Fn 61 must be enabled.
The Programmable, Multi-Event Thermostat is enabled by enabling the function Fn 52.

The option # 714B is for either Heating or Cooling control and incorporates only one probe and one internal relay. The relay is usually SPDT type with both, the Normally Open and Normally Closed contacts, available at the back panel terminal.
The option # 714C is for Heating and Cooling control and incorporates two probes and two internal relays. This option includes the auto change-over function for Heat—Cool. Models with two probes can be ordered either with one probe installed in the clock housing or optionally, with both probes connected externally to the terminal block on the back panel.
Models with two relays can be ordered with either two Normally Open or two Normally Closed SPST contacts or with two SPDT contacts, or any combination thereof.
The Programmable Thermostat may be preset for up to 32 events, separately for each of the 7 days of the week, repeated each week. Total of up to 224 events per week.
The Programmable Thermostat mode allows for programming of the time instances (hours and minutes of the day and weekday) and the Target Temperature for each event.
All programmed data is stored in the internal, non-volatile memory which is retained even without the supply power.

Programming of THERMOSTAT EVENTS

When the function Fn 52 is enabled, the thermostat may be programmed at any time during the regular clock operation and DOES NOT require invoking of the programming mode.

1. Press the SET key at any time during the normal clock operation.
The display will show “MANU” or “AUTO” text momentarily.
   A) If in the “AUTO” mode, this will be followed by the Weekday and the Event number for that day.
   NOTE: Pressing the “STOP” key at this time will invoke the MANUAL mode of operation.
   B) If in the “MANU”al mode, the current preset temperature will follow.
   NOTE: Pressing the “STRT” key at this time will invoke the AUTO mode of operation.

2. A) If in the “AUTO” mode, the event number will flash to indicate that it is active for selection. Use UP and DN keys to select the event number for that day.
   B) If in the “MANU” mode, the preset temperature will flash to indicate that it is active for selection. Use UP and DN keys to change the setting.

3. A) If in the “AUTO” mode, to move the cursor to Weekdays press the NXT key. Use UP and DN keys to select the day and then press the NXT key. The display will show the current Target Temperature for this event. Note: If this value was never stored before, it may be either very low or very high. Pressing the UP or DN key in the next step will put the value within the correct range.
   B) If in the “MANU” mode, GO TO STEP 4.

4. Using the UP and DN keys, set the required Target (Preset) Temperature.
NOTE 1  By pressing the **MUTE** key at this time, -40F (C) temperature will be brought up on display. When the Target Temperature is set to -40F (C) the preset will be **IGNORED** by the thermostat control for that event.

NOTE 2  By pressing the **CLR** key at this time the currently read probe temperature will be brought up on display.

When satisfied, press the **NXT** key.

A)  If in the “AUTO” mode, GO TO STEP 5.
B)  If in the “MANU” mode, GO TO STEP 6.

5.  The display will show the hour and the minute (HH:MM) of the event that day. Using **UP** and **DN** keys set the required time of the event. To move the cursor press the **NXT** key.

6.  When satisfied with the event presets, press the **HOLD** key to store the data in memory.

MAKE SURE that this is done WHILE either the Temperature or the event Hours:Minutes is on the display. If it is not so, the OLD data will be stored in memory.

7.  The display will flash the text: “Strd” momentarily to indicate that the programmed data has been stored in the memory.

8.  Press the **NXT** key to go back to Step 2 in order to continue programming of other events or

If finished, wait a few seconds for the system to return to the Normal Operating Mode. The thermostat program will start executing automatically.

IMPORTANT NOTES

A) In both, the “AUTO” and the “MANU” modes:

In order to ensure proper operation of **COOLING** and **HEATING**, the Auto Switch-Over limits must be programmed. This is done by programming the presets for SUNDAY Events 30 and 31. Programming of those events **must** be performed in the “AUTO” mode.

- The **COOLING switch-over** temperature limit ( SUNDAY event 31 ) is the temperature **ABOVE** which the Cooling relay will be energized and only when the Target Temperature is **lower** than the temperature sensed by the probe.
- The **HEATING switch-over** temperature limit ( SUNDAY event 30 ) is the temperature **BELOW** which the Heating relay will be energized and only when the Target Temperature is **higher** than the temperature sensed by the probe.

B) If ONLY HEATING or ONLY COOLING control is required :

- If only HEATING control is required, the HEATING switch-over temperature limit ( SUNDAY event 30 ) must be programmed as **lower** than any temperature ever expected and the COOLING switch-over temperature limit ( SUNDAY event 31 ) as **higher** than any temperature ever expected .
- If only COOLING control is required, the COOLING switch-over temperature limit ( SUNDAY event 31 ) must be programmed as **lower** than any temperature ever expected and the HEATING switch-over temperature limit ( SUNDAY event 30 ) as **higher** than any temperature ever expected .

C) The Target Temperature for the “MANU” mode:

The target temperature for the “MANU” mode is stored in SUNDAY event 29. It may be preset in either the “MANU” or the “AUTO” mode.

Note, that the “MANU” mode is also using the **HEATING** and **COOLING** Auto Switch-Over limits ( as preset for SUNDAY Event 30 and 31 ) as its operating limits. Programming of those events **must** be performed in the “AUTO” mode.

D) The order in which the thermostat is searching for active events is from event “00” thru event “31”. The search is performed at 00 seconds of each minute of the clock real time. First encountered active event shall be executed and further search shall be aborted until the next minute of the real time clock reading. Therefore, if more than one event for the day has the same time as any other, only the younger (in order) event number shall be executed. This may have application in deactivating unused events by setting them as identical to the highest used event number for the day.

E) When the Supply Power is removed between the event times, after the power is restored the thermostat will SEARCH BACK all active events that should have been executed. This search is performed in the REVERSED ORDER: from events 31 thru 00 of each day. The most recent, valid event will be executed. Therefore, care must be taken when programming the thermostat, so that the unused events in each day either have -40F(C) set as the Target Temperatures or the OLDEST event number for each day is copied into the unused events for that day.

F) SYSTEM WARM-UP :

During the first 5 minutes after the system Power-up, the temperature readings may show unreal values. The system will correct the readings after the warm-up time.
G) INTERNAL RELAYS CONTROL:
   The internal relays CONTACTS are enabled to change states only ONCE every 30 SECONDS.
   The contact designated as “COOL” will be energized when a demand for cooling (Air-Conditioning) is detected.
   The contact designated as “HEAT” will be energized when a demand for heating is detected.
   Both relays contacts are completely isolated from each other and from all other circuits.

STANDBY Light in the upper-left corner of the display indicates that the “HEAT” relay is energized.
BLINKING Light in the upper-left corner of the display indicates that the “COOL” relay is energized.

These lights may be active ONLY when the temperature is on the display.

To DISABLE the PROGRAMMABLE THERMOSTAT operation:
Disable the function Fn 52. (see FUNCTION SETUP Procedure section in the Manual). All previously preset events data will be retained in the memory unaffected.

USEFUL TIP
During the Normal Operation, when the thermostat is set to operate in the AUTO or MANU mode, it is possible to find out which event is currently being executed and with what presets.
To do that press the SET key on the remote at any time. The most recently executed event will be displayed. Use the NXT key to scroll through the day, temperature and hrs:minutes for that event.
NOTE that at this point the system will also accept new settings for this and other events.

IMPORTANT NOTE:
   If a probe is installed in, on or near the display enclosure, due to its location, its temperature may be slightly affected by the heat generated by the display and the electronics. Therefore, wiring a probe externally, if possible, in an area in which the temperature is to be controlled, is preferred.
   Also, if an internal probe is installed in the enclosure, then pulling the probe further out of its shield may lessen its sensitivity to the heat generated inside the display enclosure.
   If the model has two probes, to switch the thermostat control to the External probe, make sure that the function Fn 27 is DISABLED.

CAUTION: Avoid exposing the temperature probes to the direct sunlight as this will dramatically affect the readings.

To PROTECT the PROGRAM AGAINST ANAUTHORIZED ACCESS:

By ENABLING the function Fn 63 (see the FUNCTION SETUP Procedure section in the Manual) all access to the clock functions and to the Thermostat program via the remote control will be LOCKED-OUT. All other operation will however remain unaffected.

In order to regain the control via the Remote Controller, disconnect the supply power for 2 seconds and then restore the power and within 30 seconds Disable the function Fn 63.
All remote access to the clock will be unlocked.
Wiring for Heating and Air-Conditioning system with two Internal Relays when only SPST Contacts are used and with one external probe.

NOTE: Either Normally Open or Normally Closed contacts, or a mix of thereof may be ordered.

Well done!
ELECTRICAL SPECIFICATIONS

Supply voltage ......................... 120 VAC, 50/60Hz or optional 100V or 208-240VAC, 50/60Hz
                                  or optional 12/24V AC/DC

Power consumption ...................... appx. 6VA max. for 4" and 18VA Max for 7" and models with text
Fuse ........................................ Slow Blow, 20mm, 0.25A for 120V supply, 0.125A for 208-240V supply.
Power backup ............................ 14-Day Battery-less, self-recharging backup
                                  or optional: 10-Year Lithium battery

Ambient temperature .................. standard 0°C (32°F) to +60°C (+140°F) . Optional –40°C (-40°F) to +80°C (+176°F)
Ambient humidity ........................ 85%RH max., non-condensing
Display ...................................... LED Super or Ultra Bright, 4 or 6 digits (other sizes optional)

Internal relays ........................... Optional up to 2 x SPDT with 0.047µF/120ohm snubber, 10Amp/250VAC max.
Internal Buzzer ......................... Piezo, Single Tone, 85dB min. Optional external sirens and buzzers.

Short Timer preset range .............. 0 to 99Hrs:59min:59sec. up or down
Long Timer preset events ............. Up to 32 events per each different day, 7 day

Event duration programmability .... 0 to 59 seconds in 1 sec. steps or extended till next event
Timers resolution ........................ 1 sec. Standard, 1/100 sec. Optional

Clock accuracy ........................... +/- 20 ppm standard or +/- 2 ppm optional in stand-alone mode.

Event counter range .................... programmable 0 to 9999(99) counts up or down

Counter/Timer input spec’s .......... Dry contact, min. pulse width 2 msec. Max. pulse frequency 250Hz

Internal Temperature probe .......... NTC Thermistor 1%, 50kohm or 100kohm, -40°C (-40°F) to 124°C (255°F).
                                  Other optional.

External Temperature probe ........... Remotely wired up to 500 Ft. (150M)
                                  Option 1. NTC Thermistor 1%, 50kohm, -40°C (-40°F) to 140°C (284°F)
                                  Option 2. NTC Thermistor 1%, 100kohm, -40°C (-40°F) to 140°C (284°F)
                                  Option 3. RTD PT1000, 0.12%, 0°C (-50°F) to 150°C (302°F)
                                  Option 4. RTD PT1000, 0.12%, -50°C (-58°F) to 450°C (842°F)

Temp. test/preset range .............. Option 1: -40°C (-40°F) to 101.6°C (215°F)
                                  Option 2: -50°C (-58°F) to 537.7°C (999.9°F)

Temp. test resolution ................. 0.1°C (0.1°F)

Temp. readout resolution ............. 1°C (1°F) or 0.1°C (0.1°F) depending on options
WARNING

NOTE:
The Federal Communications Commission has established technical standards regarding radiation of radio frequency energy by computing devices. Your display is considered to be a Class A Computing Device, and the following information must be supplied to the User in accordance with paragraph 15.818 of the FCC Regulations, Title 47, Chapter 1, Part 15, Subpart J.

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 environment is likely to cause interference in which case the user at his own expense will be required to take whatever steps are necessary to correct the interference.
LIMITED WARRANTY

For a period of one year from the date of delivery, (90 days for the keyboard) the Manufacturer warrants to the original user that the display system shall be free from defects in materials and workmanship. This warranty shall be void if the unit is altered or modified in any way by the user or when the use, installation or application is different from that specified in the instructions. This warranty shall not apply to external parts including the cabinet, and repairs or replacements caused by neglect, abuse, loss or damage resulting from any cause beyond the control of the Manufacturer or damage caused by fire, flood, acts of God, or other casualties or if the product name or serial # have been altered, defaced or removed.

If a defect occurs during the warranty period, the unit must be returned with PRE-PAID shipping to a duly authorized Repair Center for repair. A copy of the original sales invoice or lease agreement must accompany the returned unit. The purchaser's sole and exclusive remedy in the event of defect is limited to the correction of the defect, adjustment, repair, replacement or complete refund at the election of the manufacturer.