

SELENA

Multifunctional
LED CLOCK

series HY-4 and HY-6
Rev. V27



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INDEX

	PAGE
Features	3
Installation	4
Power Connection	4
IR Remote Control.....	5
REMOTE CONTROL KEYS description.....	5
Function Setup Procedure.....	6
LIST OF FUNCTIONS	7
Clock Setup	12
Initiating Remote Control operation	12
Time/Date Setup	12
Display Mode Setup	12
Date/Text and ZONE Text Display	13
Wake-Up Alarm Clock Setup.....	14
Up/Down Stopwatch Timer and Event Counter	15
Cycling Up/Down Timer Setup	16
Up/Down Timer Recovery after Power Failure	17
1/100 Second Resolution for Up Timer / Stopwatch	17
AUTO-Restart for Up Timer / Stopwatch	17
External Inputs for Up/Down Stopwatch Timer and Event Counter	18
Programmable Multi-Event Timer.....	20
Internal Control Relay.....	21
Internal Control Relay Wiring.....	21
External Alarm Siren / Buzzer wiring	22
Master - Slave Synchronized System Clock Networks	24
Power Line Carrier Sync Signal.....	24
Master—Slave Sync System with Serial Communication.....	25
2-Wire Master—Slave System Installation	26
Master—Slave System Installation with PC as the Master	26
Master - Slave Sync Signal Range Extender-Repeater.....	29
ASCII Time Code protocol.....	29
Minute Impulse Sync System	36
BCD Time Code Synchronization Slave/Receiver	37
Multi-Zone Clock Systems.....	37
Temperature Monitoring and Control.....	39
Min/Max Temperature Memory	42
Programmable Multi-Event Heat/Cool Thermostat.....	42
Electrical Specifications.....	48
Warranty.....	50

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.

Models 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.

POWER Connection

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

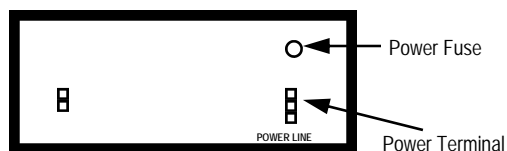
Make sure that all power is disconnected.

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 "POWER LINE" on the back panel of the enclosure.



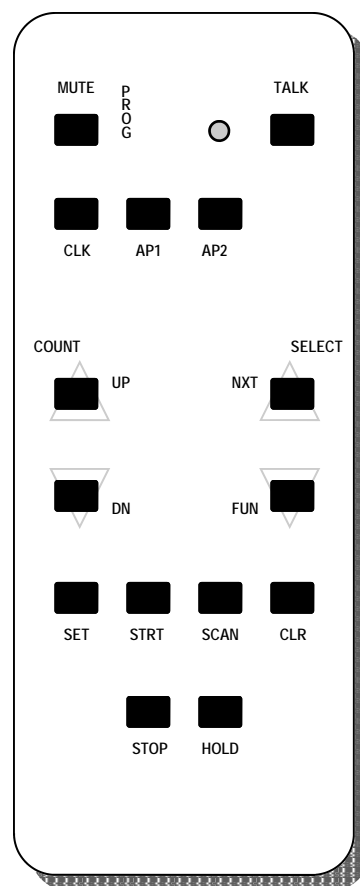
2. Connect the Power Line wires, including the Ground wire, to the corresponding terminals and tighten the screws securely.
If the Ground wire or the Ground Terminal is not available, leave that terminal unconnected.

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

SELENA Remote key	RCA Remote key
MUTE	MUTE
TALK	POWER
CLK	TV
AP1	CABLE
AP2	VCR
UP	VOLUME UP
DN	VOLUME DOWN
NXT	CHANNEL UP
FUN	CHANNEL DOWN
SET	REW
STRT	PLAY
SCAN	FF
CLR	REC
STOP	STOP
HOLD	PAUSE



REMOTE CONTROL KEYS description

MUTE	<ol style="list-style-type: none"> 1. Activates the Programming Mode by pressing the MUTE key 5 times within appx. 3 seconds. 2. MUTE internal Alarm Buzzer.
TALK	Initiate spoken announcement (optional) or start Text display scan.
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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

NXT	<ol style="list-style-type: none"> 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).
FUN	<ol style="list-style-type: none"> 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.
SET	INITIATES the PRESET of Timers/Stopwatch/Thermostat or Counter and text in clocks with text display.
STRT	STARTS/RESTARTS the Timer/Stopwatch/Counter. In the Programmable Thermostat mode initiates AUTOMATIC control.
SCAN	RESUMES the display scrolling (alternating) mode during regular operation.
CLR	<p>Clears or Resets specific data.</p> <ol style="list-style-type: none"> 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.
STOP	<p>HALTS the Timer/Stopwatch/Counter operation.</p> <p>In the Programmable Thermostat mode initiates MANUAL control.</p>
HOLD	<ol style="list-style-type: none"> 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.

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. 3 seconds**.

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.
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 regular 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 presettable 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 presettable 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)
- Fn 5 DATE:WEEKDAY.MONTH** display (7 segments)
- Fn 6 DATE:MONTH.YEAR** display (7 segments). Also used to display JULIAN DAY when Fn 44 is enabled.
- Fn 7 HOURS:MINUTES.SECONDS** Presetable **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 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.*

- 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 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/counter 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 mode 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 in 1/100 resolution 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 6 (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 week separately. The timer will control the internal Alarm Buzzer and the internal Relay as enabled by functions **Fn 17** and **Fn 37**.
- 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 to Fn 710 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 85)
“IN” probe temperature display format: “ **IN XXX C (F)** “
- Fn 76** TEMPERATURE display in the TEXT display section (see Fn 85)
“OUT” probe temperature display format: “ **OUT XXX C (F)** “
- Fn 77** TEMPERATURE display in the TEXT display section (see 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 Fn53) 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 Fn37). 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 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.
- | | | |
|--------------|--------------|------------------|
| Fn 94 | Fn 95 | Displayed text |
| OFF | OFF | “In” and “Out” |
| ON | OFF | “Air” and “h2o” |
| OFF | ON | “Air” and “Pool” |
| ON | ON | “Pool” and “Out” |

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 used.

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 it 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. 3 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. 3 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 regular operation.

After initiating the clock PROGRAMMING mode as described above, 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 regular operation.

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

NOTE, that the clock **Seconds MAY BE 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. Go to the Function Preset Mode (See "**LIST OF FUNCTIONS**") by following the steps listed in "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

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 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 and disable **Fn 62** within 33 seconds.

(Also see Function **Fn 63**).

DATE / TEXT and ZONE Text display (Optional Feature)

This **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:

	Fn64	Fn65	Fn66	
Mode "0"	OFF	OFF	OFF	* no date display
Mode "1"	ON	OFF	OFF	FRI-OCT-12
Mode "2"	OFF	ON	OFF	OCT-12-FRI
Mode "3"	ON	ON	OFF	12-OCT-FRI
Mode "4"	OFF	OFF	ON	FRI-12-OCT
Mode "5"	ON	OFF	ON	12-OCT-2007
Mode "6"	OFF	ON	ON	OCT-12-2007
Mode "7"	ON	ON	ON	2007-12-OCT

* **NOTE** : If the Functions Fn 64,65,66 are set to 000, the **Date Text** 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 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**.

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.

WAKE -UP ALARM CLOCK Setup

SELENA can be set to function as an **Alarm Clock** and perform presettable 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 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.

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.

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.

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 feature controls the buzzer sound to come on less frequently at the beginning and becomes more frequent as the alarm continues. This makes the wake-up alarm buzzer less annoying.

The **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 **disabled** 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 **disabled** 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 35,38,39,)
Fn 73	Tmr MM-SS (timer) (also see Fn 35,38,39,)
Fn 74	TIMER HH-MM (timer or counter) (also see Fn 35,38,39,)

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 Fn87 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.

NOTE: In the **Counter mode** the colon is extinguished.

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:

1. 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 Function Fn 49 for how to set 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 count-down 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 can only 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: This function should be used when the external inputs for Start, Stop, Reset are installed (**Fn 36**), since the speed of reaction to the STRT or STOP key on the remote is not determined and cannot be predictable with the 1/100 sec resolution. However, the 1/100 stopwatch can be operated via the remote when the function **Fn 59** is enabled.

AUTORESTART 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 **Autorestart** 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 **Autorestart** mode can be used to "measure" the time periods between periodically occurring events (the START input activations).

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 key. In the Event Counter mode (Fn 31), the count will be incremented by 1.

B) If the Function **Fn 58** is **ENABLED**, activating the START input will start or restart the timer only if the STOP (HALT) input is NOT activated.

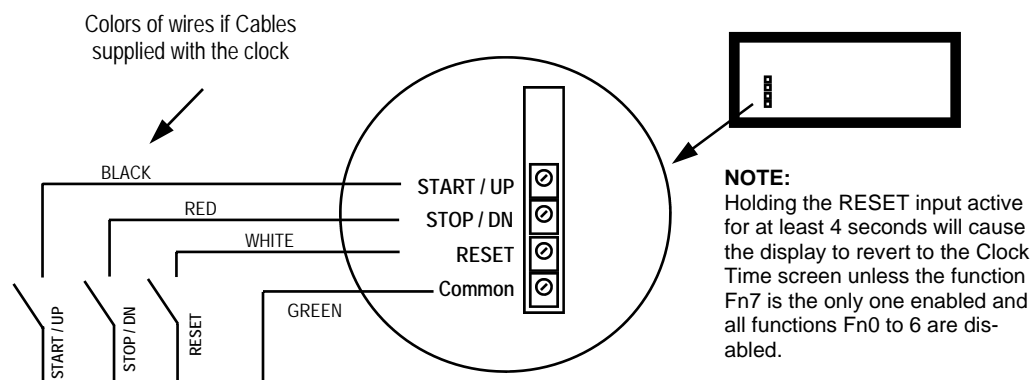
In the Event Counter mode (**Fn 31**), activating the UP input will increment the count by 1.

3. A) If the Function **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 key on the remote.
B) If the Function **Fn 58** is **ENABLED**, activating the STOP (HALT) input will "halt" the timer.
C) If the Function **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.

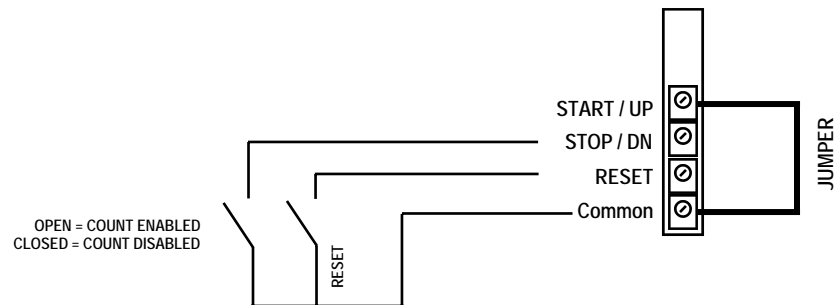
In the Event Counter mode (**Fn 31**), activating the DN input will decrement the count by 1.

NOTE: If the internal buzzer is enabled (**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 **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 **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 **Fn 59** is also enabled, in which case the **CLR** key may also be used to reset the timer.

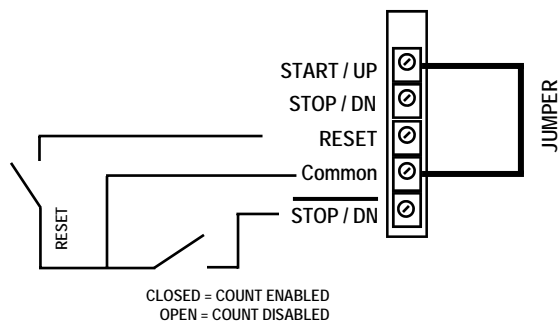


TYPICAL WIRING OF EXTERNAL DRY CONTACT SWITCHES FOR TIMER/COUNTER OPERATION



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**)



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**)

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 relay 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 may be selected by enabling the function **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.

MULTI-EVENT TIMER PROGRAMMING

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 normal clock operation.
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 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 duration period in **seconds** for the Alarm event being programmed.
NOTE that when the duration is set to **59 seconds**, the relay (or buzzer) will remain energized (if enabled by function Fn37) until the next occurring Alarm 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 event and also some options can cause the internal Relay 2 to be activated as well. The Relay 2 contacts are accessible on the outside of the clock.

Using the **UP** and **DN** keys preset 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 time and duration, press the **HOLD** key to store the data in memory.
MAKE SURE that this is done **WHILE** either the **duration** or the **Alarm Hours:Minutes** is on 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 Alarm Events
or
Wait a few seconds for the system to return to the Normal Operating Mode. The Event Timer schedule will be begin executing automatically.

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 unused alarm events by setting them as identical to the highest used event number for the day.

To Enable the Internal Relay 1 operation during the Timer Alarm periods, enable the function **Fn 37** (see FUNCTION SETUP Procedure section).

To Enable 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** 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 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 alarm data will be retained in the memory unaffected.

For instructions on how to connect to the Internal Alarm Relay see the section: “**INTERNAL CONTROL RELAY Wiring**”.

INTERNAL CONTROL RELAY (Optional Feature)

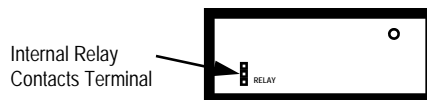
The internal control Relay 1 is enabled by enabling the function **Fn 37**. The Relay 2 is enabled by specific applications. The Presettable Stopwatch/Timer/Counter, Programmable Thermostat, Programmable Multi-Event Timer and Temperature HIGH/LOW ALARM can activate ONE or TWO internal Control Relays 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 will remain active only for a 3 seconds period.

INTERNAL CONTROL RELAY Wiring

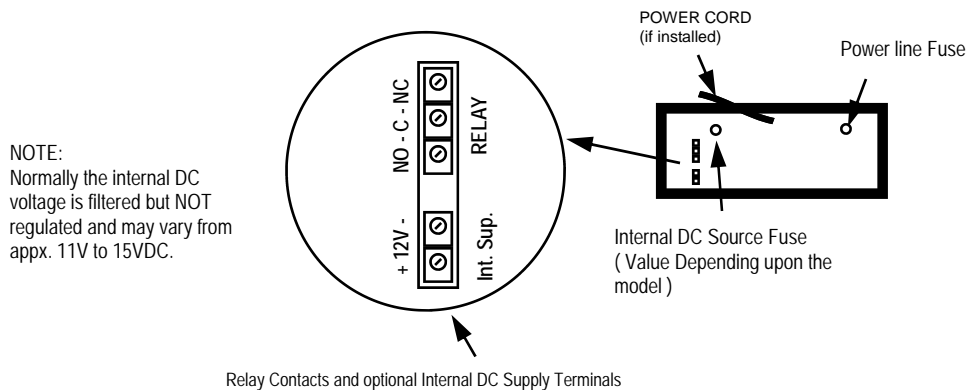
Make sure that all power is disconnected.

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:



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**.

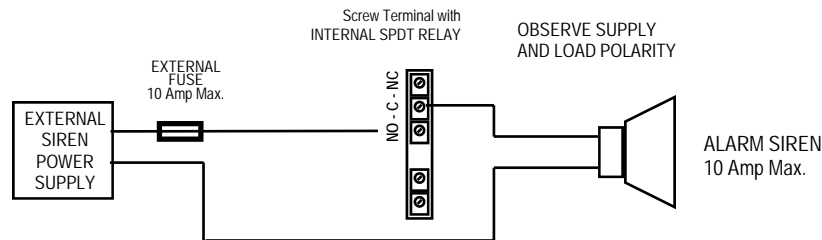
Several control modes of the Internal Relay are possible depending upon the settings of the functions **Fn 16**, **18** and **Fn 49**.

- 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 Expiry (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 Expiry (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 Expiry (ALARM) only for a **period of 3 seconds** and will remain NORMALLY switched **OFF** in all other conditions.

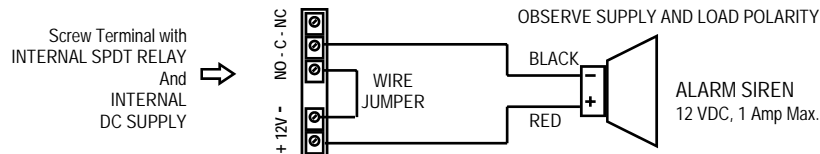
In all of the above modes, to Reset the Internal Relay to the **OFF** state and to Reset the Timer/Counter, press the **SET** key or the **CLR** key, or activate the external **RESET** input.

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.



Alarm Siren Application Using External Power Source



DC Alarm Siren Application Using Internal DC Source

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 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 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 Synch** protocol only the Sync signal may be either a dedicated wire with High Voltage (usually same as the line voltage) or a Low Voltage (12/24V 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, 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)

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. Press the "SCAN" key to return to the regular time display.
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 Synch 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

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 Lathem 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.

Clock Configuration Table for the SELENA Time Sync protocol :

Fn32	Fn33	Fn34	Fn89	Fn88	
OFF	ON	ON	X	X	SLAVE: repeats the display data from the Master clock screen, but also synchronizes its internal clock to the time data from the Master
OFF	OFF	ON	X	X	SLAVE: synchronizes its internal clock to the time data from the Master
OFF	ON	OFF	X	X	SLAVE: only repeats the display data from the Master clock screen
ON	ON	OFF	OFF	X	MASTER: transmits the data all the time at 9,600 or 1,200 Baud
ON	ON	OFF	ON	X	MASTER: transmits the data every 1 second at 600 or 300 Baud
ON	OFF	OFF	OFF	X	MASTER: transmits the data all the time at 9,600 or 1,200 Baud
ON	OFF	OFF	ON	X	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:

Fn89	Fn88	
OFF	OFF	9,600 Baud
OFF	ON	1,200 Baud
ON	OFF	600 Baud
ON	ON	300 Baud

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

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 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

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.

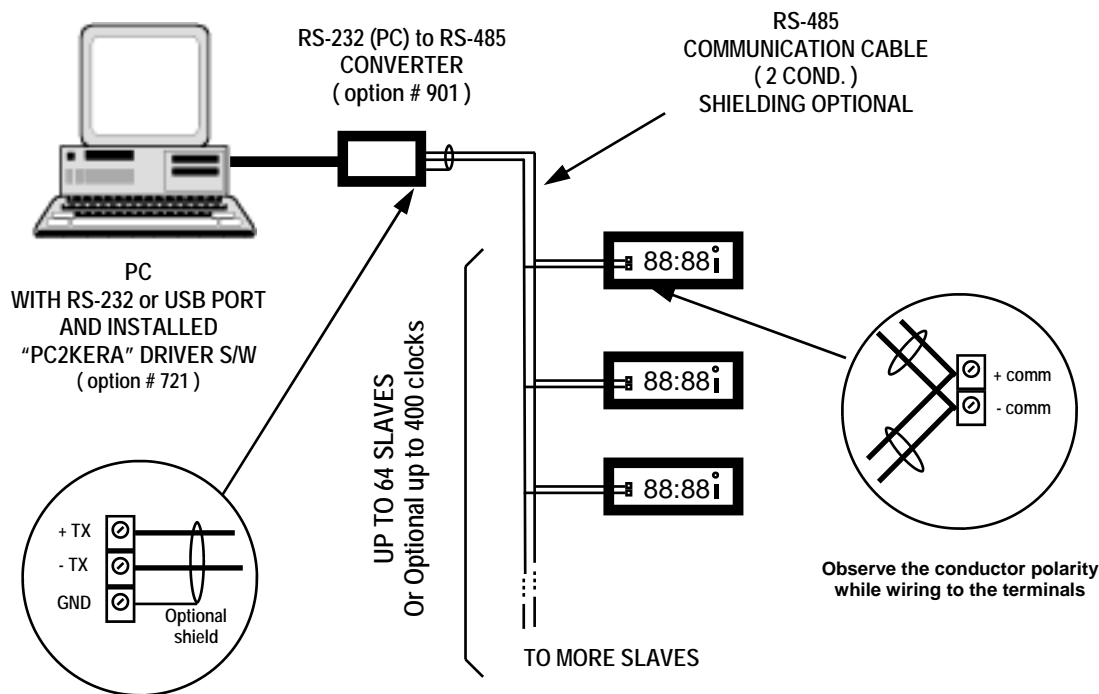
The **Master PC** may **broadcast** the sync signal **directly** into the slave network **or** it may send the sync to the **First Slave** that is setup as the **Sync Repeater clock** which will then broadcast the signal to other slaves.

Consult the particular communication protocol since not all are allowed to use the sync repeater functions.

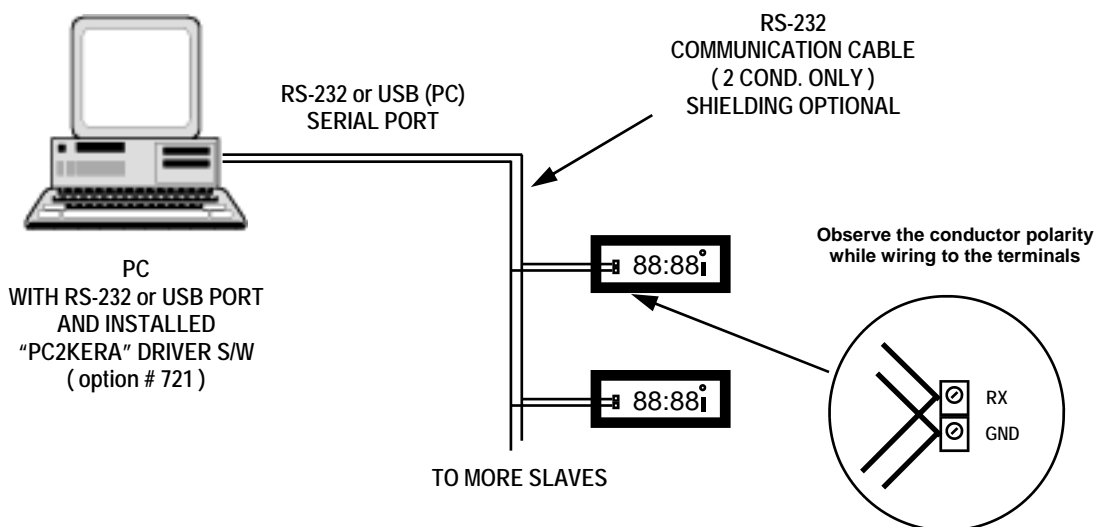
For the SELENA Sync Standard Protocol:

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.

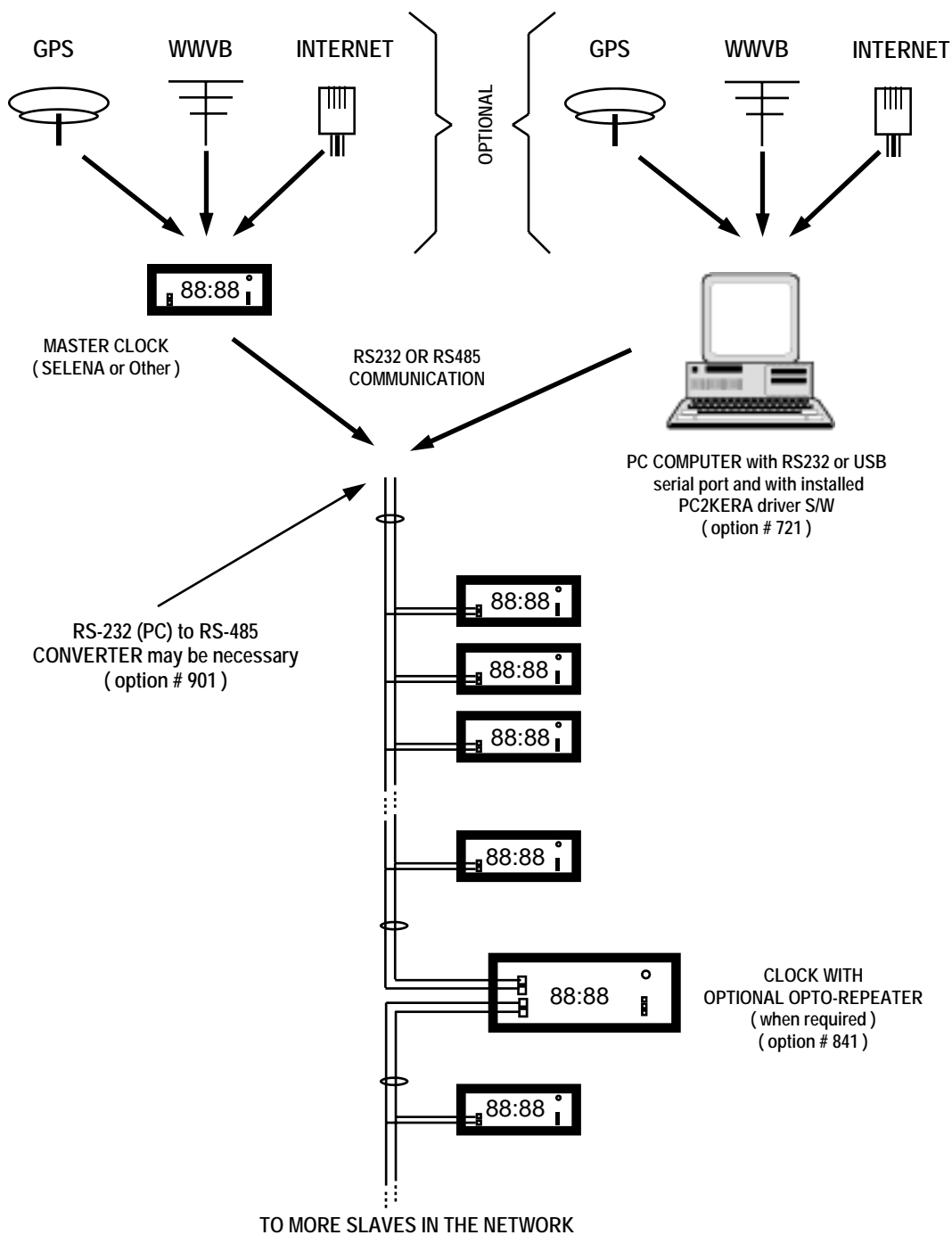
In order to have the whole system synchronized with, for example, the Atomic Clock time or a GPS Atomic Time, another widely available software package may be installed on the same PC that will allow for updating of the internal PC clock through the internet, a special WWVB (or other Time Broadcasting radio stations) receiver card, a GPS or a network, or manually.



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



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



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.

MASTER – SLAVE SYNC SIGNAL RANGE EXTENDER – REPEATER configuration (SYNC REPEATER function Fn53)

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:

Fn32	Fn33	Fn34	Fn53	
ON	X	OFF	ON	The SELENA Master clock transmits the sync at each 05th second of each minute
OFF	X	ON	ON	The slave REPEATER clock LISTENS at the "NN-1" channel and retransmits the sync at the "NN" Channel
OFF	X	OFF	ON	The slave clock LISTENS at the "NN" channel

Where: X = Don't care

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

Fn 55	Fn 54	
OFF	OFF	sync channel at 15th second
OFF	ON	sync channel at 25th second
ON	OFF	sync channel at 35th second
ON	ON	sync channel at 45th second

NOTE 1: Remember to correctly select the **Communication Speed (Baud rate)** by enabling appropriate 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.

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

	Fn13	Fn12	Fn11	
Format "0"	OFF	OFF	OFF	SELENA may be set as a Slave (Fn 34) or as the Master (Fn32)
Format "1"	OFF	OFF	ON	SELENA may be set as a Slave only (Fn 34)
Format "2"	OFF	ON	OFF	SELENA may be set as a Slave only (Fn 34)
Format "3"	OFF	ON	ON	SELENA may be set as a Slave (Fn 34) or as the Master (Fn 32)
Lathem Format	ON	ON	ON	SELENA may be set as a Slave only (Fn 34)

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:

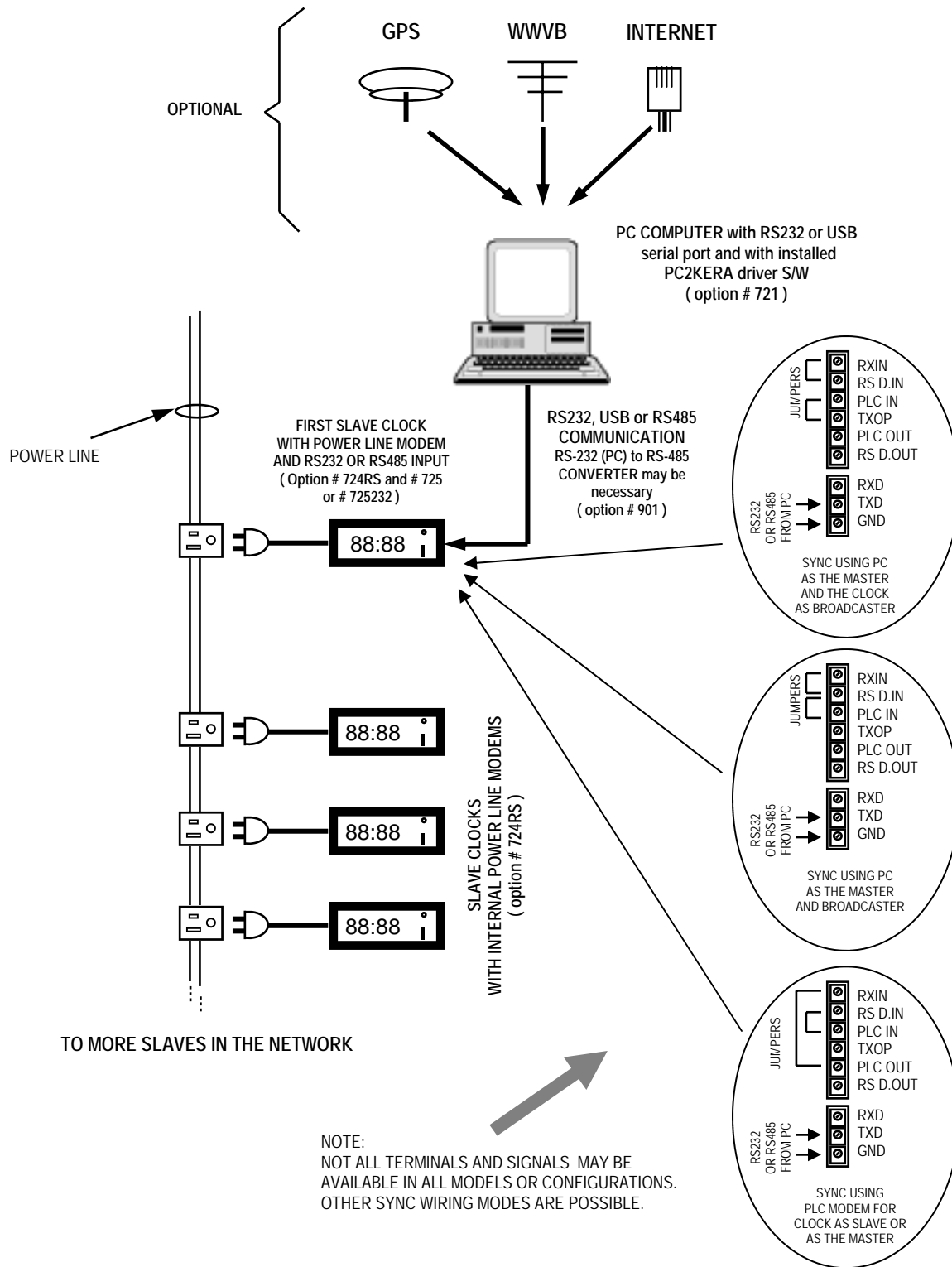
Format 0: (CR)(LF)I(^)DDD(^)HH:MM:SS(^)DTZ=XX(CR)(LF)
 Format 1: (CR)(LF)I(^)WWW(^)DDMMYY(^)HH:MM:SS(CR)(LF)
 Format 2: (CR)(LF)IQYY(^)DDD(^)HH:MM:SS.sss(^)LD
 Format 3: 0003(^)YYYYmmdd(^)HHMMSS(+/-)HdHdMdMdD#(CR)(LF)

where:

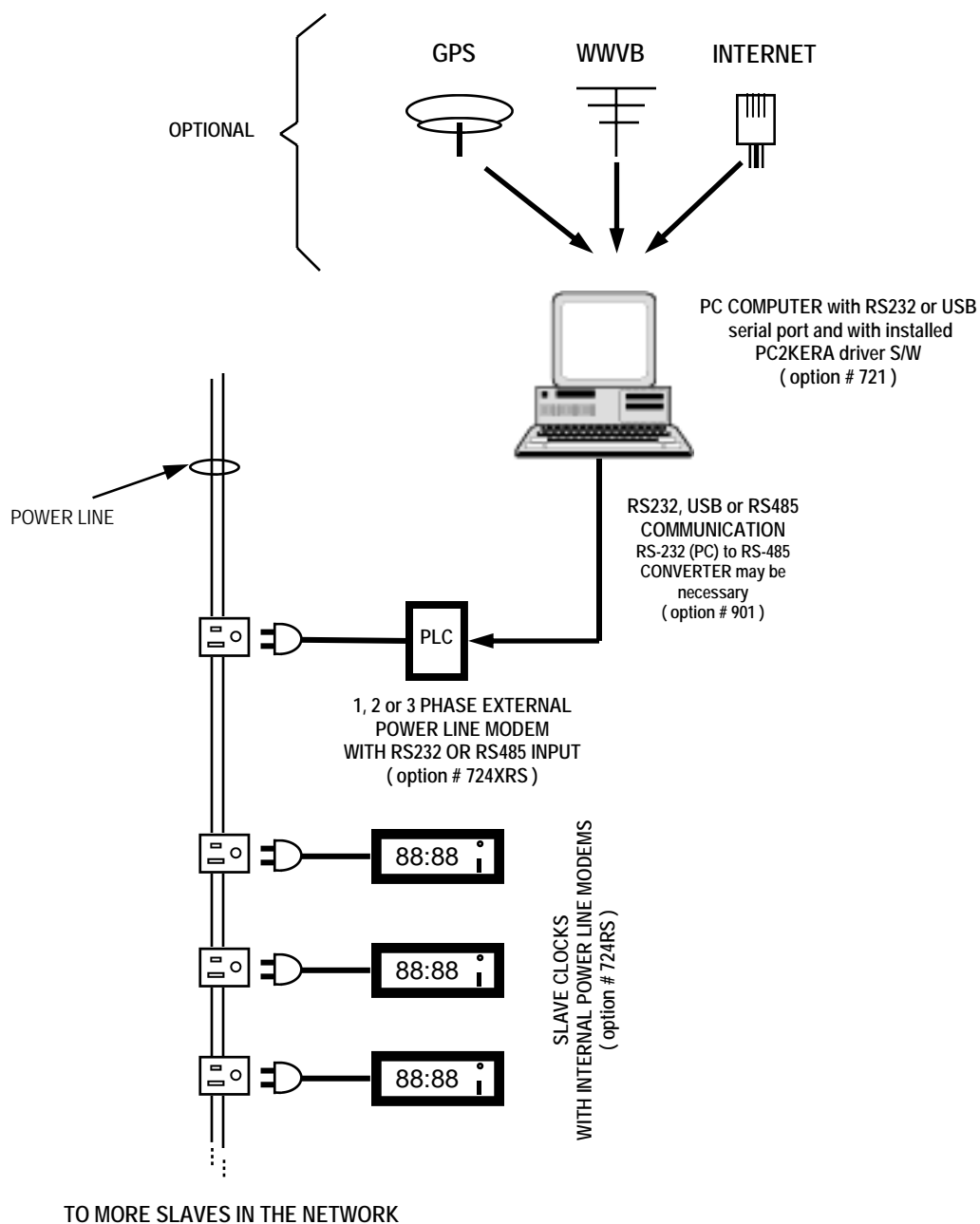
CR = Carriage Return

LF = Line Feed

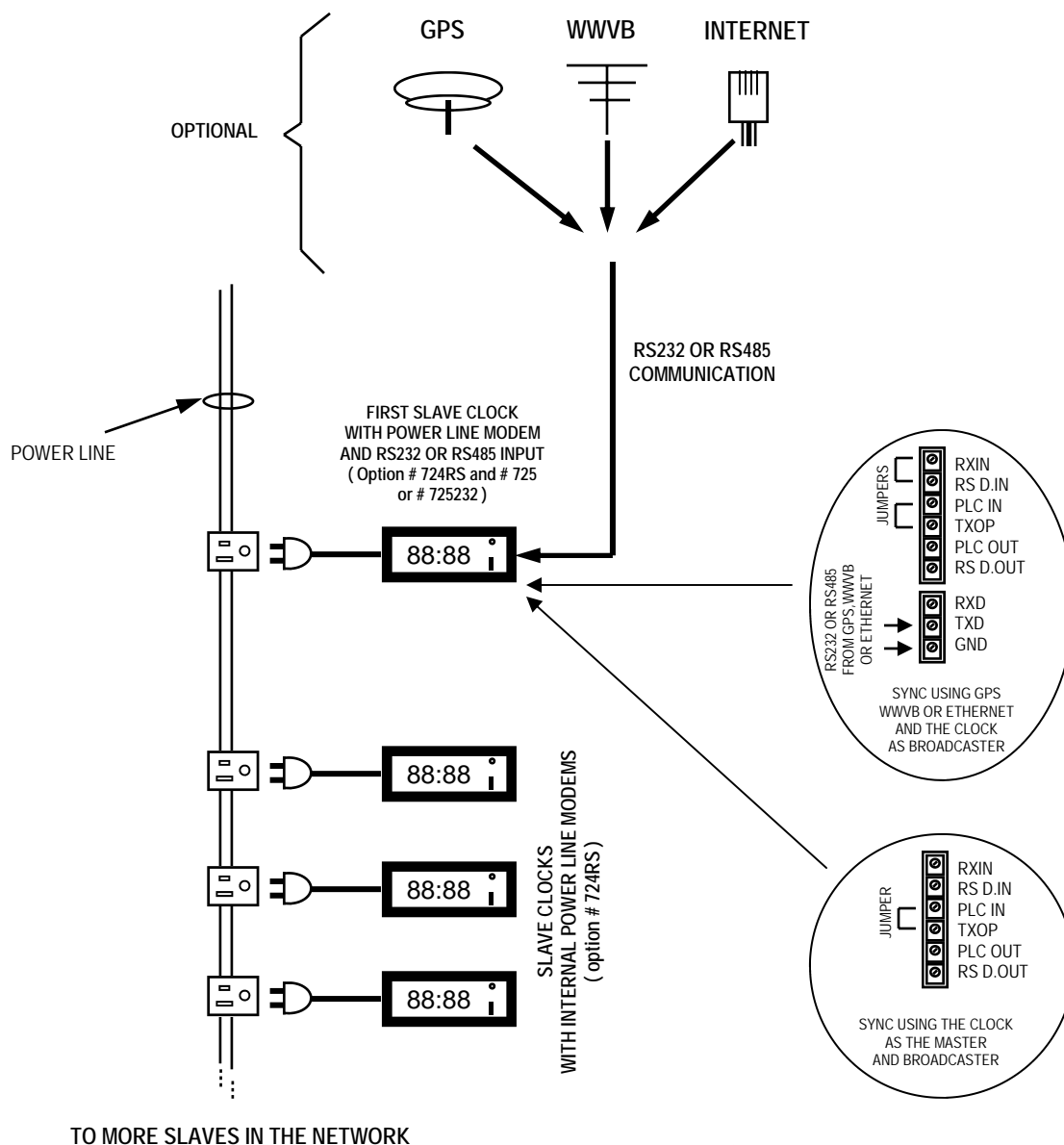
I = Time Sync Status (space, ?, *)



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

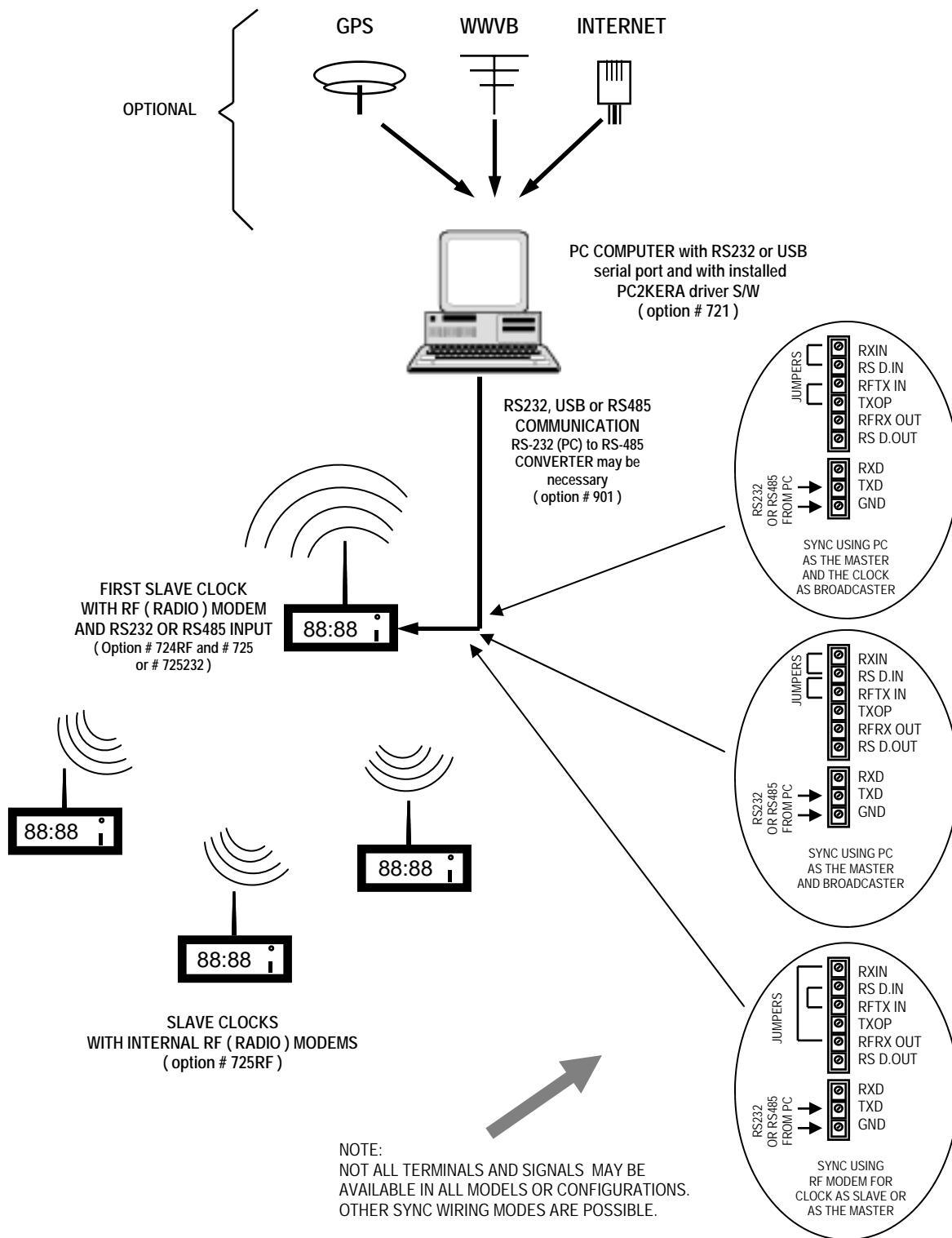


MASTER—SLAVE SYSTEM WITH COMMUNICATION over the POWER LINE WIRING
using EXTERNAL PLC MODEM and a PC AS THE MASTER.

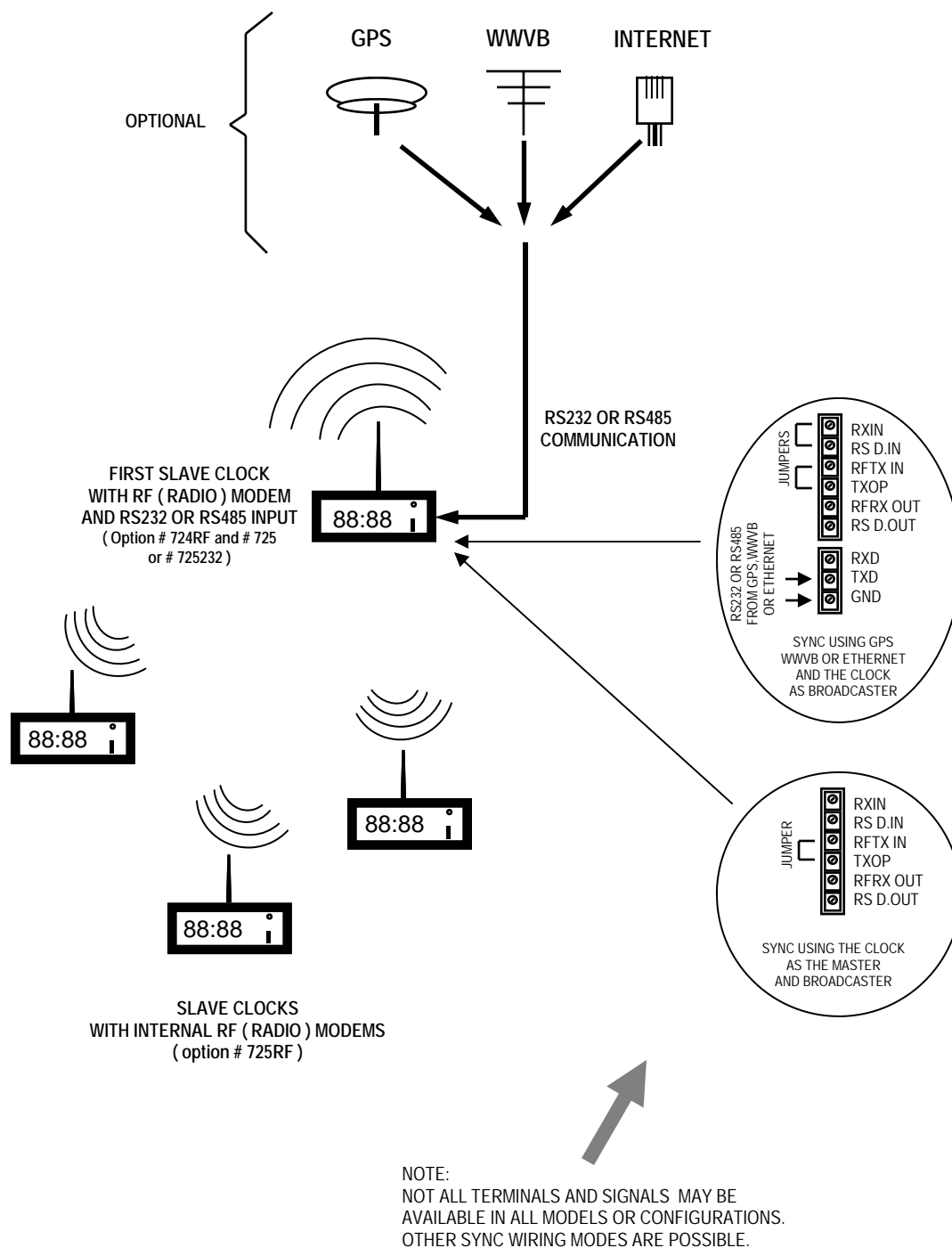


NOTE:
NOT ALL TERMINALS AND SIGNALS MAY BE
AVAILABLE IN ALL MODELS OR CONFIGURATIONS.
OTHER SYNC WIRING MODES ARE POSSIBLE.

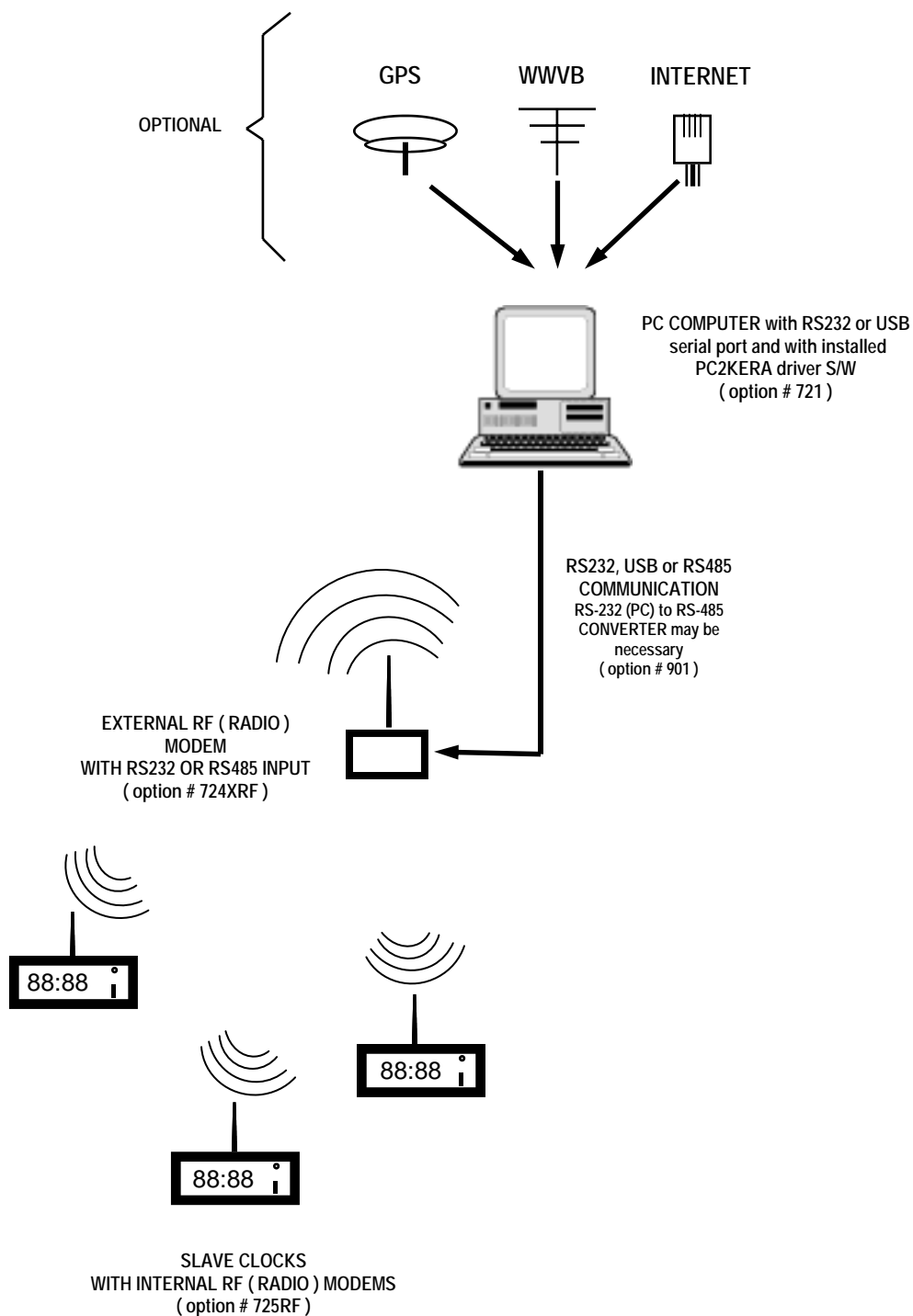
MASTER—SLAVE SYSTEM WITH COMMUNICATION over the POWER LINE WIRING
using SELENA AS THE MASTER.



MASTER—SLAVE SYSTEM WITH RF (RADIO) COMMUNICATION
using SELENA WITH INTERNAL RF MODEM and a PC AS THE MASTER.



MASTER—SLAVE SYSTEM WITH RF (RADIO) COMMUNICATION
using SELENA with INTERNAL RF MODEM AS THE MASTER.



MASTER—SLAVE SYSTEM WITH RF (RADIO) COMMUNICATION
using EXTERNAL RF MODEM and a PC AS THE MASTER.

^ = 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, 03 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 "0,1, 2 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 and 3 may be selected for 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/Deselecting 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 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

The 24VDC MINUTE IMPULSE Synchronization slave mode may be activated by enabling the Function **Fn 47**. SELENA clocks will respond to Minute Pulses within the range of +/- 7 to 30 VDC presented at the appropriate inputs. The current load requirement on Line A and Line B inputs are very low and are equivalent to an Input Resistance of 10 Kohm per input. Additional functions Fn 11 and Fn 12 can also be set to select the specific protocol for the Minute Pulse sync as follows:

Fn11	Fn12	OPERATION
OFF	OFF	58th Minute reference for 2- or 3-Wire system (Only Line A used by SELENA)
ON	OFF	59th Minute reference for 2- or 3-Wire system (Only Line A used by SELENA)
OFF	ON	1 Minute Reverse Polarity (Only Line A used by SELENA)
ON	ON	1/2 Minute Reverse Polarity (Only Line A used by SELENA)

Additional Special synch 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 Negative Synch signal presented on Line B. The protocol will be similar as in the Power Line Carrier Synch mode (see Power Line Carrier synch description), except that a **Negative DC Signal** 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.

BCD Time Code synchronization Slave / Receiver (SIMPLEX compatible)

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 +/- 7 to +/-30 VDC presented at the appropriate inputs. The current load requirements are very low and are equivalent to an Input Resistance of 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

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 these functions may be also used when setting up the time zones to prevent the master or other zones from being altered accidentally 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 SECONDS SYNC FUNCTION ENABLED** (Fn 50, Fn 51) Option # 741 for Firmware Versions 24 and earlier has been discontinued.

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, 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 starting time / 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:

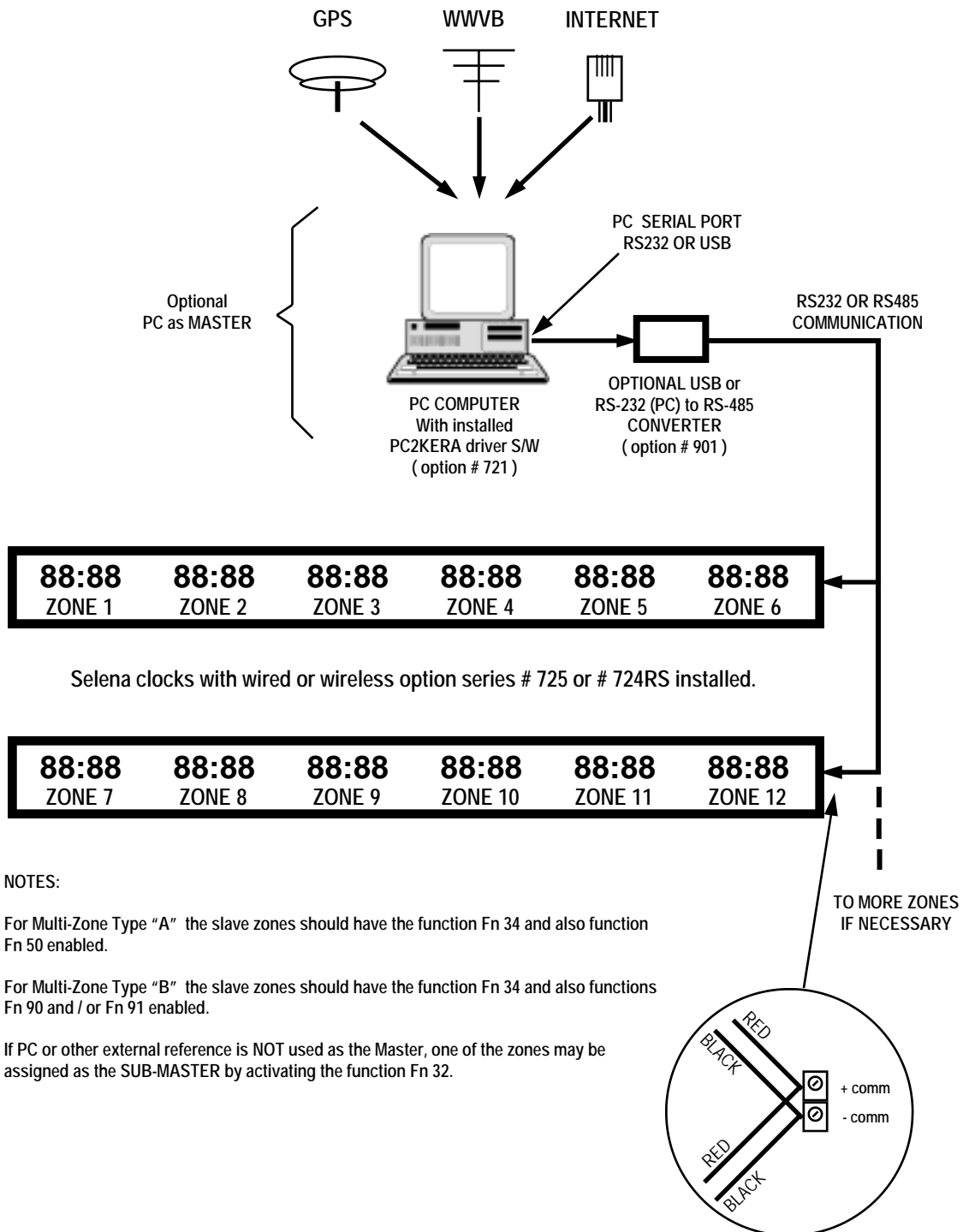
- 1) **The SELENA Time Sync protocol**, and in some instances **also other protocols**, **MAY NOT ALLOW** the slave to sync to the master signal from the 50th second of the previous till the 5th second of the next minute.
- 2) **When Fn 91 is enabled (x5th Minute-Units sync)**, the slave will sync on 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:

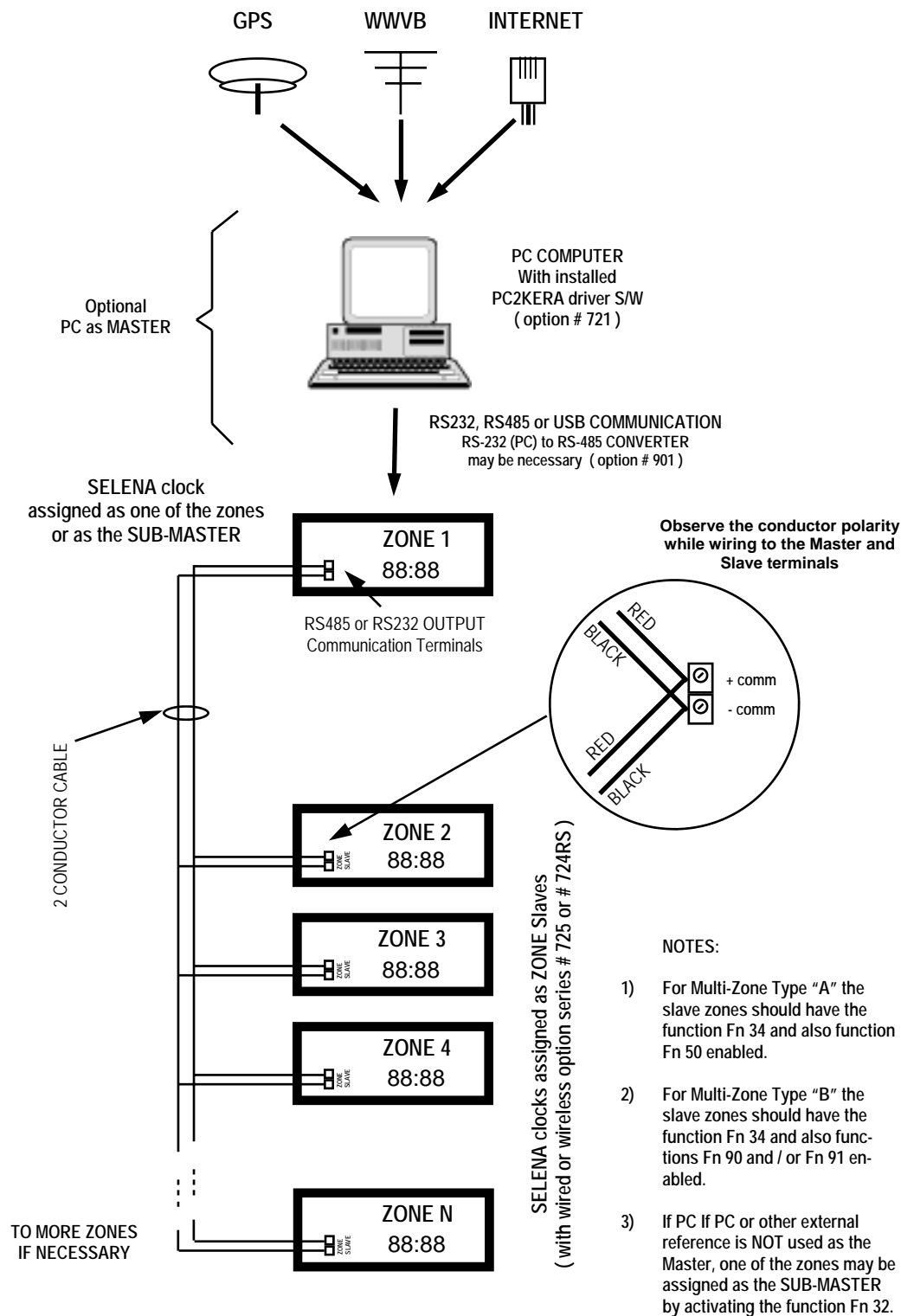
If the particular zone requires that the zone minutes are not multiples of the Master 5-minute periods, the function **Fn 91 SHOULD NOT BE ENABLED**. Only the function **Fn 90** should be activated thus allowing the slave to sync to the **SECONDS ONLY**, and all minutes and hours should be initially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



EXAMPLE OF WIRED MULTI-ZONE SYSTEM
WITH ZONE CLOCKS ENCLOSED IN COMMON ENCLOSURE

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.

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

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 both be 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 probe(s) can be located at a significant distance away, usually 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 **Minimum and Maximum Temperature** readings that can be displayed *ON DEMAND* via the remote (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 and Alarm Buzzer** as well as to indicate the ALARM status on the display (see **Fn 29**).

TEMPERATURE PROBE type selection

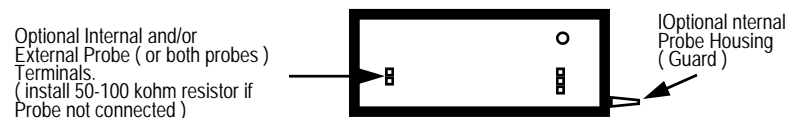
The system can operate with two different types of NTC temperature probes specified as 50Kohm or 100Kohm depending upon the setting of the function **Fn 93**. Enable this function only if 100 kohm probes are installed.

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.

EXTERNAL TEMPERATURE PROBE Installation

Make sure that all power is disconnected.

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



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: In some models additional terminals may be provided for wiring of the "internal probe" rather than a probe already installed in the display Housing. All operation of such probe remains unaffected, but care should be taken to avoid unwanted transfer of the clock's or other equipment heat/cold to the probe in order to prevent incorrect readings.

Temperature Display and Control activation (enable Fn 61 to activate the temperature test functions)

1. 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). If the INTERNAL probe is selected as the control probe (by enabling Fn 27, then enable Fn 0 instead of Fn 1.
2. 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).
3. Press the **FUN** key until the display shows the present temperature reading with flashing the "**C**" or "**F**" character. Toggle between CELSIUS or FAHRENHEIT unit by pressing the **UP** or **DN** key.
4. Press the **NXT** key until the display shows the text "**LoAL**" and set the desired LOW TEMPERATURE ALARM using the **UP** and **DN** keys.
5. Press the **NXT** key until the display shows the text "**HiAL**" and set the desired HIGH TEMPERATURE ALARM using

the **UP** and **DN** keys.

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

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.

NOTE: In clocks with the **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**).

MIN / MAX TEMPERATURE MEMORY

This option may be activated by enabling the function Fn 20.

External (or Internal) temperature Maximum and Minimum readings are saved in the internal memory that can be recalled for display via the remote 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 SELECTED, 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.

PROGRAMMABLE MULTI—EVENT HEAT/COOL THERMOSTAT

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 terminal.

The **option # 714C** is for Heating **and** Cooling control and incorporates two probes and two internal relays. This option includes auto change-over for Heat—Cool.

Models with two probes can be ordered with one probe installed in the clock housing or optionally with a terminal block on the back panel for an externally connected probe.

Models with two relays can be ordered with either **two Normally Open or two Normally Closed SPST** contacts or with **two SPDT** contacts.

By enabling the function **Fn 52**, the Programmable Thermostat mode may be preset for up to **32 events separately for each of 7 days**, 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, permanent memory which is retained even without the supply power.

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.

Fn 94	Fn 95	Displayed text
OFF	OFF	"In" and "Out"
ON	OFF	"Air" and "h2o"
OFF	ON	"Air" and "Pool"
ON	ON	"Pool" and "Out"

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 Fn 2 to Fn 7.

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**).

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 **EXTERNAL** temperature **PROBE** may be selected for control by enabling (INTERNAL selected) or disabling (EXTERNAL selected) 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.

THERMOSTAT EVENTS PROGRAMMING

When the function **Fn 48** 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 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 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 in **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.

E) 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.

STEADY 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:minute 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**.

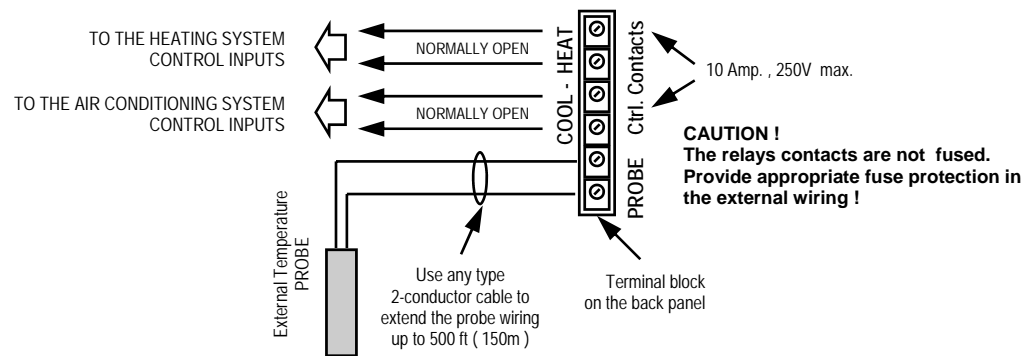
CAUTION: Avoid exposing the temperature probes to the direct sunlight as this will dramatically affect the readings.

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 will be LOCKED-OUT. All other operation will however remain unaffected.

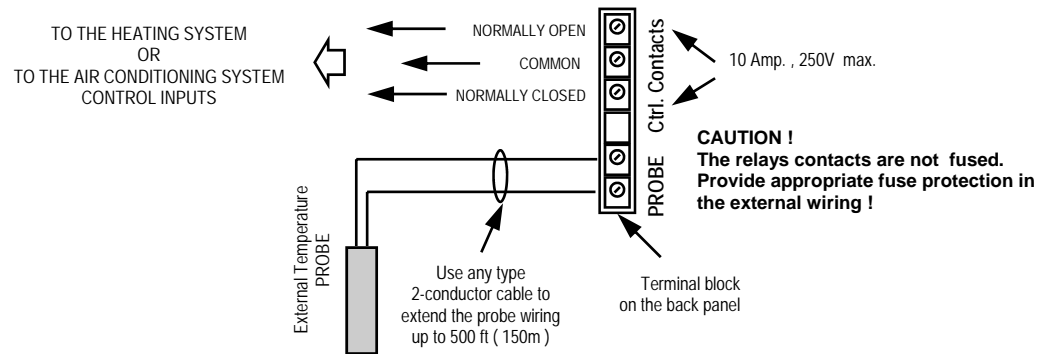
In order to regain the control via the Remote Controller, remove the supply power for 2 seconds and then restore the power and within 30 seconds Disable the function 63.

All remote access to the clock will be unlocked.

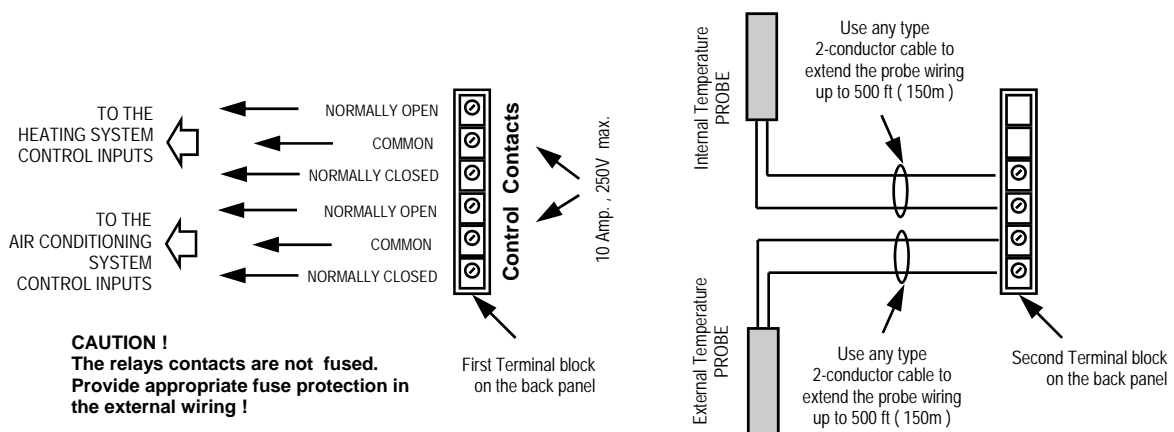


Wiring for Heating and Air-Conditioning system with two Internal Relays when only SPST Contacts are used and with one external probe.

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



Wiring for ONLY Heating (or ONLY Air-Conditioning) system with one Internal SPDT Relay and with one external probe.



Wiring for Heating and Air-Conditioning system with two Internal Relays when both SPDT Contacts may be used and with two external probes.

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	0.25A, Slow Blow, 20mm
Power backup	14-Day Battery-Less backup or optional: 10-Year Lithium battery
Ambient temperature	0C (32F) to 60C (140F)
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 0.047uF/120ohm snubber, 10Amp/250VAC max.
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
Timers resolution	1 sec. Standard, 1/100 sec. Optional
Event counter range	presetable 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, -40C (-40F) to 140C (284F)
External Temperature probe	Remotely wired up to 500 Ft. (150M) Option 1. NTC Thermistor 1%, 50kohm, -40C (-40F) to 140C (284F) Option 2. NTC Thermistor 1%, 100kohm, -40C (-40F) to 140C (284F) Option 3. RTD PT1000 , 0.12%, -50C (-58F) to 150C (302F) Option 4. RTD PT1000 , 0.12%, -50C (-58F) to 450C (842F)
Temp. test/preset range.....	Option 1: -40C (-40F) to 101.6C (215F) Option 2: -50C (-58F) to 537.7C (999.9F)
Temp. test resolution	0.1C (0.1F)
Temp. readout resolution	1C (1F) or 0.1C (0.1F) 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.