



ET- BIG CLOCK BOX V2

ET-BIG CLOCK BOX V2 is a Digital Clock in a format of red Dot-Matrix 8x32 (256 DOT), with 2-Line; the maximum size of number is 7.5cm. (Height) X 5.5cm. (Width) per each digit (size of each number is variable, depending on the chose display mode). It can show Date, Time, Temperature, Humidity, or be used as Stop Watch all in one. The Clock uses Time Base from RTC DS3231 internal board and it uses IR Remote to control and setup values for the Clock.

There are various formats of display that can be set for Board ET-BIG CLOCK BOX V2 such as Date, Time, Temperature, Humidity, or be used as Stopwatch, or show the flashing message “Open” or “Close”. The Display of this Clock has 2 lines, data format that will be shown in each line is setup by Keys on Remote differently; or user can choose and setup any display format in each line as preferred.

1. SPECIFICATIONS OF ET-BIG CLOCK BOX V2

- ◆ Be Digital Clock Display with 2-Line
- ◆ Display is a red Dot Matrix 8x32 (256 DOT) with 2-Line; the maximum size of numeric value is 7.5 cm (H) X 5.5 cm. (W)
- ◆ Use AC 220V Power Supply; show time value in a format of 24-hour only
- ◆ Show different data on both lines simultaneously; or, choose and setup any favorite data format to show on the line.
- ◆ Use MCU AVR EASY MEGA328 to process data of Clock
- ◆ Clock receives all Commands through IR Remote that is provided with a set of product
- ◆ IR-Remote uses 3V BATTERY No.CR2025 (provided in the set); the Clock uses 3V BATTERY BACK UP No.CR2032 (provided with a set of product)
- ◆ Various display formats can be chosen and setup for Display such as Time, Date, Temperature, Humidity, or be used as Stop Watch, or show flashing message “Open” or “Close”. Remember, Font that is used for each display mode might be different.
- ◆ ON-OFF Display, Adjust brightness of Display for 16-Level (0-15), including to reset the Clock by IR Remote
- ◆ Choose year type either as Christian Era and Buddhist Era (show the last 2-digit only)
- ◆ Choose and setup display format according to any favorite Key after Power-ON or RESET
- ◆ Only show the positive value of Temperature
- ◆ Have Sensor Probe AM2301 to connect and measure Temperature and Humidity from external and then show the value on the Display.
- ◆ Have ON-OFF DISPLAY MODE, MODE STOP WATCH, Custom- Display Mode to choose display format in each line according to user’s requirement

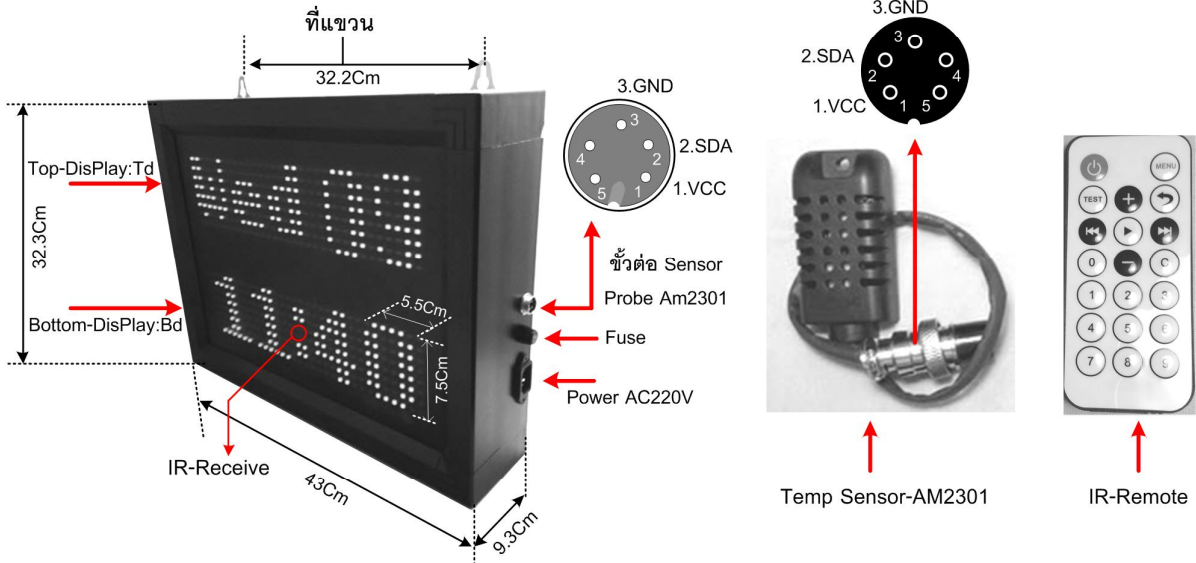
2. PACKAGE OF ET-BIG CLOCK BOX V2 includes

- ET-BIG CLOCK BOX V2 provided with 3V BATTERY Backup (#CR203) and Fuse 250V/2A inside
- Sensor Probe AM2301 measures Temperature and Humidity
- ET-IR Remote Key
- Cable Power 3P AC 220V



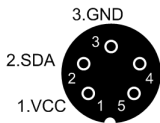


3. STRUCTURE AND CONNECTORS OF ET-BIG CLOCK BOX V2

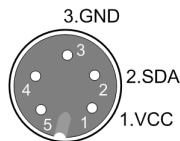


IR-Remote: IR-Remote controls the display and setup values for the Clock; it uses 3V Battery No.CR2025.

Temp Sensor-AM2301: This Sensor measures Temperature and Humidity (provided with a set of product) that can be connected to Connector of the Clock directly. Pins are arranged as shown below.



Connector Sensor Probe Am2301: It is connected to Sensor to measure Temperature and Humidity of ETT “PROBE AM2301 LED 20 CM”; Pins are arranged as below;



Fuse: It inserts Grass Fuse AC 220V, 2A to prevent the circuit from short circuit or overload current.

Power AC220V: It is connected to Cable Power 3P AC 220V.

IR-Receive: This position receives Signal from IR-Remote Sender to process data and control the Clock.

Top-Bottom Display: It is a red Dot Matrix Display 8x32 DOT, there are various display formats that can be chose and setup by IR-Remote Key0-9, C, Test, |<<, >>|, |>, +, -.

4. HOW TO RUN ET-BIG CLOCK BOX V2

After provided AC 220V for the Clock completely, there is running message to tell the currently used model of FW; next, the system reads Setup values from EEPROM internal MCU such as brightness of display, display mode, and Flag values. Next, it reads Time Base from RTC DS3231 internal the Clock, value of Temperature and Humidity from the connective external Sensor, and then, it saves these values. Next, it checks display mode and the display. If user has setup Config Key in any Key, the Clock also reads and shows the value on the display according to the setting Key; next, Program loops and waits to receive the pressing Remote from user. If user does not press any Remote, Program reads Time Base from RTC to update the display; if it is in display mode of Temperature or Humidity, Program also reads the values of Temperature and Humidity from Sensor to show on the Display. While Display is running in any Key Mode, user can press Remote to change the preferable display mode. For more information, please read section 5: Function of Keys on Remote.



5. FUNCTION OF KEYS ON REMOTE

ET-BIG CLOCK BOX V2 receives Commands through IR-Remote only. Feature and Structure of Remote is shown on the right side.

Function of each Key is described below;

1) Key-Power [Power icon]: This is Key ON/OFF Display in the format of Toggle; when pressing this Key, it is ON and OFF the Display alternately. When the Display is turned off, the system internal the Clock still runs as normal but user cannot press any Key on Remote, except this Key ON/OFF. When the Display is tuned on again, other Keys are used as normal.

2) Key-Menu [MENU icon]: Enter Mode Setup to setup values and exit from Mode Setup instantly to return to normal screen display (for more information, please read section 6: Mode Setup).

3) Key-Test [TEST icon]: Upper Display: Show flashing messages between "Open" and "Close alternately. This Key runs in a format of Toggle; when this Key is pressed each time, the Display shows between both messages alternately. Lower Display: Show Time value of Hour:Minute (hr:mn)

4) Key-Up [+ icon]: Enter Mode Stop Watch, Start, Stop, and Clear Stop Watch all in one. The operation is arranged as mentioned above. The Upper Display shows the unit of Minute:Second and the Lower Display shows unit of 1/100 Seconds. Time is shown in a range of 00:00:00 to 59:59:99. When this Key is in Mode Setup, it is used to move up a Main Menu or a Setup value, respectively.

5) Key-Return [Return icon]: Reset the Clock as the same as ON/OFF Display and it has no any effect on any setting value of user. When this Key is in Mode Setup, it is used to exit from each Menu of Mode Setup step by step and it becomes function Key Reset again.

6) Key-Left [Left arrow icon]: Upper Display: Show Date/Month in a numeric format (dt/mm) Lower Display: Show Time value in a format of Hour:Minute:Second (hh:mm:ss) When this Key is in this Mode Setup, it is used to move a Sub-Menu to the right side.

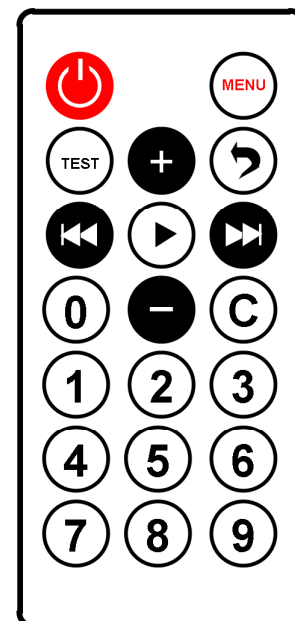
7) Key-Play [Play icon]: Show values in Custom-Setup Mode that user has setup in Menu Config. The Sub-Menu Bd: is data format that is setup to show on Lower-Display; and the Sub-Menu Td: is data format that is setup to show on Upper-Display. When this Key is in Mode Setup, it is used to save setting values in EEPROM.

8) Key-Right [Right arrow icon]: Upper Display: Show Date/Month/Year in a numeric format (dt/mm/yr) Lower Display: Show Time value as Hour:Minute:Second (hr:mn:ss) When this Key is in Mode Setup, it is used to move a Sub-Menu to the left side.

9) Key-Down [Down arrow icon]: Upper-Display: Show Time value as Hour, Minute, Second in a format of Digital Code 8421 (-- | -- | --) Lower-Display: Show Time Value as Hour:Minute:Second (hr:mn:ss) When this Key is in Mode Setup, it is used to move down a Main Menu or a Setup value, respectively.

10) Key-C [C icon]: Upper-Display: Show percentage of Humidity (HH.H%) Lower-Display: Show Temperature value that must be positive value only, in a unit of degree Celsius ("TT.T °C)

11) Key-0 [0 icon]: Upper-Display: Show Temperature value that must be positive value only, in a unit of degree Celsius (" TT.T °C) Lower-Display: Show Time value as Hour:Minute (hr:mn)





- 12) Key-1 [**1**]/:
Upper-Display: Show Days of a week (abbr) and Date (ex: Sun 10)
Lower-Display: Show Time value as Hour:Minute (**hr:mn**)
- 13) Key-2 [**2**]/:
Upper-Display: Show Date and Month (abbr) (ex: 12 Jun)
Lower-Display: Show Time value as hour:Minute (**hr:mn**)
- 14) Key-3 [**3**]/:
Upper-Display: Show Date/Month in a numeric format (ex: 15/07)
Lower-Display: Show Time value as Hour:Minute (**hr:mn**)
- 15) Key-4 [**4**]/:
Upper-Display: Show Days of a week (abbr) and Date (ex: Thu 07)
Lower-Display: Show Time value as Hour:Minute:Second (**hr:mn:ss**)
- 16) Key-5 [**5**]/:
Upper-Display: Show Temperature value that must be positive value only, in a unit of degree Celsius (" **TT.T °C**)
Lower-Display: Show Time value as Hour:Minute Second (**hr:mn ss**)
- 17) Key-6 [**6**]/:
Upper-Display: Show Date/Month in a numeric format (ex: 21/05)
Lower-Display: Show Time value as Hour:Minute Second (**hr:mn ss**)
- 18) Key-7 [**7**]/:
Upper-Display: Show Temperature, percentage of Humidity (%), Date and Month (abbr); it alternately shows each value and then changes every 10 seconds. It is arranged in an order as follows;
Temperature(**TT.T °C**) ---> % Humidity (**HH.H %**) ---> Date and Month (20 Sep)
Lower-Display: Show Time value as Hour:Minute (**hr:mn**)
- 19) Key-8 [**8**]/:
Upper-Display: Show Days of a week (abbr) and Date, Temperature, percentage of Humidity (%); it alternately shows each value and then changes every 10 seconds. It is arranged in an order as follows;
Days of a week and Date (Mon 14) ---> Temperature (**TT.T °C**) ---> Humidity (**HH.H %**)
Lower-Display: Show Time value as Hour:Minute (**hr:mn**)
- 20) Key-9 [**9**]/:
Upper-Display: Show percentage of Humidity (%), Temperature, Date and Month (numeric value); it alternately shows each value and then changes every 10 seconds. It is arranged in an order as follows;
% Humidity (**HH.H %**) ---> Temperature (**TT.T °C**) ---> Date and Month (18/09)
Lower-Display: Show Time value as Hour:Minute (**hr:mn**)

NOTE: As mentioned above, function of Keys runs when it is not in Mode Setup (when Key Menu is pressed). For Key Menu, Key Up, Key Down, Key Left, Key Right, Key Play, and Key Return can be used together as co-switch in Mode Setup.



Referred to the diagram above, it consists of 3 Main Menus and Sub-menus of each Main Menu to setup values. Meaning of each abbreviation that is used in each sub-menu is described as follows;

Main Menu

Time: Setup Time value of Hour, Minute for Time Base RTC DS3231; Setting values are

Sub-Menu (While saving the setting value, Time value of Second is setup as 0)

- Hr:xx (Hour)** = Time value is setup in a format of 24-hour system; it is setup as Hour in a range of 0-23 hour
- Mn:xx (Minute)** = Setup time value as Minute in a range of 0-59 minutes

Date: Setup Days of a week, Date, Month and Year (Christian Era or Buddhist Era) for Time Base RTC DS3231. Setting values are



Sub-Menu

- Dy:xx (Day)** = Setup Days of a week from Sunday to Saturday (Su-Sa); when Su:Sunday, Mo:Monday, Tu:Tuesday, We:Wednesday, Th:Thursday, Fr:Friday, Sa:Saturday
- Dt:xx (Date)** = Setup Date of Month in a range of 1-31
- Mt:xx (Month)** = Setup Month in a range of 1-12
- Yr:xx (Year)** = Setup Year type either to be Christian Era or Buddhist Era (the chosen value will be used as the display format of the Clock)
 - TH:** Setup Year type as B.E. 25xx (Default); only last 2-digit is setup in a range of 00-99 (should setup as 43-99)
 - EN:** Setup Year type as A.D.20xx; only last 2-digit is setup in a range of 00-99 (should setup as 00-56)

***NOTE:** It should setup Year value for RTC DS3231 in a range of A.D. 2000-2100 or B.E. 2543-2643. However, the Year value of both Christian Era and Buddhist Era that is setup for RTC must be conformed with and RTC can run correctly. Moreover, the Year value should be setup in a range of A.D. 2000-2056 or B.E. 2543-2599.*

Conf: (Configuration) Setup the essential values for the Clock as follows;

Sub-Menu

- Md:xx (Mode Display)** = Choose and setup any preferable display format on the screen that will be conformed with the pressed Key on the Remote; K0-K9, KC, K-, K+, KR, KL, KT, KP (>). Every time the device is Power-ON, any Key format that is chosen is always shown on the screen.
- Br:xx (Brightness)** = Adjust brightness of Display in a range of 00-15 (00:Minimum, 15:Maximum)
- Bd:xx (Bottom Display)** = Choose data to show on the Lower-Display; the data will be shown when the Key  is pressed. It can choose data format as follows;
 - C0:** Show Time as **hr:mn** [12:00] , **C1:** Show Time as **HR:MN ss** [12:0022] ,
 - C2:** Show Time as **hr:mn:ss** [12:00:05] , **C3:** Show Time as Binary Code BCD8421 **hr | mn| ss** [---|---|---] ,
 - D0:** Show Day/Date as **dy dt** [Sun 20] , **D1:** Show Date/Month as **dt mm** [19 May],
 - D2:** Show Date/Month as **dt/mm** [20/05] , **D3:** Show Date/Month/Year as **dt/mm/yr** [19/05/61]
 - Tm:** Show Temperature in a unit of degree Celsius [25.6 °C] , **Hu:** Show percentage of Humidity [59.9%]
 - Ct:** Show 3 letters of city's name (abbr.), please choose the city's name in sub-menu of **Ct**
- Td:xx (Top Display)** = Choose data to show on the Upper Display; when the Key  is pressed, the chosen value will be shown on the display; in this case, the data format can be setup as same as the Sub-Menu **Bd:xx**



Ct:xx (City Name Code) = When setting data format in the Sub-Menu Bd:xx or Td:xx as Ct, it chooses 3 letters of city's name (abbr.) to show on the display. Please look at the table below, it shows a list of city's name.

Select City Name	City Name Display	Full City Name
เลือกชื่อเมือง	ชื่อเมืองที่ใช้แสดงผล	ชื่อเต็ม
AT	ATH	Athens
BE	BER	Berlin
BK	BKK	Bangkok
CA	CAI	Cairo
CH	CHI	Chicago
DX	DXB	Dubai
HK	HKG	Hong Kong
LA	LAX	Los Angeles
LI	LIS	Lisbon
LO	LON	London
MA	MAD	Madrid
ME	MEX	Mexico City
MI	MIA	Miami
MO	MOW	Moscow
NY	NYC	New York
PA	PAR	Paris
RI	RIO	Rio De Janeiro
RO	ROM	Rome
SI	SIN	Singapore
ST	STO	Stockholm
SY	SYD	Sydney
TP	TPE	Taipei
TY	TYO	Tokyo



- **HOW TO USE MENUS OF MODE SETUP:** According to diagram of Menu above, it summarizes how to use Menus of Mode Setup as follows;


- 1) Press Key to enter Mode Setup; the Display shows the message "SETUP" for a while and then enter the first Main Menu "Time".
- 2) Press Key or Key to choose the preferable Main Menu to setup value.
- 3) After chose the preferable Main Menu for setting value completely, press Key to go to the sub-menu of the Main Menu, and the Display shows the first sub-menu of the Main Menu.
- 4) Press Key or Key to choose the preferable sub-menu for setting value.
- 5) After chose the preferable sub-menu completely, press Key or Key to choose and setup values for the sub-menu.
- 6) After setup values for the sub-menu completely, press Key to save. The Display shows the tick sign at the position of the setup value for a while and it also produces Beep sound twice; it means that all setup values are saved completely. Now, user can return to step 4 to choose the next sub-menu.

After setup the values of sub-menu completely but user doesn't press any Key Save, all new setup values are not used; or, if user exits from Mode Setup without saving any value, all values that are used are still the old; or, if user moves to other sub-menus and then returns to the previous one that user recently setup but user does not save any new setup value yet, all new setup values are not updated. In summary, after setup value for any sub-menu completely, please always press Key Save , otherwise it is not updated and it has no any effect on the operation of the Clock.



- 7) When user is in any sub-menu and wants to return to Main Menu in order to change and go to other Main Menu, please press the Key to go backwards a step by step until it returns to Main Menu, and then user can start step 2 again.













- 8) If user wants to exit Mode Setup, please press the Key  repeatedly until it exits from Mode Setup (Display stops at normal display mode of Time); or, please press the Key  only one time, it exits Mode Setup instantly.

NOTE: When it presses the Key  to save value in any sub-menu, it only saves the value of the chosen sub-menu; it does not save all sub-menus of Main Menu. So, it always presses the Key Save after setup value of each sub-menu completely. Values that are related to Conf will be saved in EEPROM; it still remains although Power OFF and it will be called after POWER-ON. Values of Time, Date that are related to setting Time will be setup for RTC DS3231; so, it has to insert Battery Backup and RTC will run correctly although POWER-OFF.






















7. HOW TO USE ET-BIG CLOCK BOX V2

This section describes how to setup values for ET-BIG CLOCK BOX V2 to run in display modes correctly according to user's requirements. If user does not edit or change value of any sub-menu, please press the Key  or Key  to skip the sub-menu to the next one instantly.

7.1) HOW TO SETUP TIME: It has an effect on the operation of Time Base from RTC DS3231. Please follow these instructions;







- 1) Press Key  to enter Mode Setup.
- 2) Press Key  to enter Main Menu: Time.
- 3) Press Key  or Key  to setup Hour value (Hr:xx) in a format of 24-hour (00-23).
- 4) Press Key  to save the Hour value.
- 5) Press Key  to change a new sub-menu and go to setup Minute value.
- 6) Press Key  or Key  to setup Minute value (Mn: 00-59).
- 7) Press Key  to save the Minute value.
- 8) Press Key  to exit from Mode Setup.





7.2) HOW TO SETUP DATE: It has an effect on the operation of Time Base from RTC DS3231. Please follow these instructions;





- 1) Press Key  to enter Mode Setup.
- 2) Press Key  to choose Main Menu: Date.
- 3) Press Key  to enter Main Menu: Date.
- 4) Press Key  or Key  to setup Days of a week (Dy:Su-Sa) Sunday-Saturday.
- 5) Press Key  to save the value of days of a week.
- 6) Press Key  to change a new sub-menu and go to setup Date value.
- 7) Press Key  or Key  to setup the Date value (Dt:01-31).
- 8) Press Key  to save the Date value.
- 9) Press Key  to change a new sub-menu and go to setup Month value.
- 10) Press Key  or Key  to setup the Month value (Mt: 01-12).
- 11) Press Key  to save the Month value.
- 12) Press Key  to change a new sub-menu and go to setup Year value.
- 13) Press Key  or Key  to choose format of Year value (Yr:TH=B.E.; or EN=A.D.).
- 14) Press Key  to save the format of Year and the Display enters mode of setting Year value automatically.
- 15) Press Key  or Key  to choose and setup the last 2-digit of Year value as follows;
Buddhist Era (25xx): The value of xx should be setup in a range of 43-99.
Christian Era (20xx): The value of xx should be setup in a range of 00-56.
- 16) Press Key  to save the Year value, especially the last 2-digit.












7.3) HOW TO SETUP CONFIGURATION: It setup values for the Clock, please follow these instructions;


- 1) Press Key  to enter Mode Setup.
- 2) Press Key  repeatedly until it found Main Menu: Conf.
- 3) Press Key  to enter Main Menu: Conf.
- 4) Press Key  or Key  to choose and setup display format (Md: K0-K9, KC, KT, K+, K-, KP, KR, RL).
- 5) Press Key  to save the setting values of display format; this display format always be called after Power-ON or Reset.

- 6) Press Key  to change a new sub-menu and go to setup brightness value of Display.
- 7) Press Key  or Key  to setup the brightness of Display (Br: 00-15) when 00=Min, 15=Max.
- 8) Press Key  to save the brightness value of Display.



- 9) Press Key  to change a new sub-menu and go to setup display format of Lower-Display.
- 10) Press Key  or Key  to choose the display format for Lower-Display (Bd: C0-C3, D0-D3, Tm , Hu , Ct. Please look at the Section 6 above).
- 11) Press Key  to save the display format for Lower-Display

- 12) Press Key  to change a new sub-menu and go to setup display format of Upper-Display.
- 13) Press Key  or Key  to choose the display format for Upper-Display (Td: C0-C3, D0-D3, Tm, Hu, Ct. Please look at the Section 6 above).
- 14) Press Key  to save the display format for Upper-Display


- 15) Press Key  to change a new sub-menu and go to setup city's name; please go to sub menu of **Bd:** or **Td:** and then setup the value as **Ct.**
- 16) Press Key  or Key  to choose the preferable Code of city name (for example, setting **Ct: AT, HK.** Please look at section 6 above for more information).
- 17) Press Key  to save the Code of city name
- 18) Press Key  to exit from Mode Setup.


From Step 8-16, the setting display format will be shown on the Display when user pressed the Key  on Remote; user can choose and setup display mode independently.

7.4) HOW TO ON/OFF DISPLAY:

It only presses Key ; if the Key is pressed for the first time, it is OFF Display; but, if the Key is pressed for the second time, it is ON Display instead. When using this Key, the Display must be run in the normal mode display according to the setting Key. While being OFF Display, the systems internal the Clock still runs as usual but user can't press any Key, except Key  to ON/OFF Display only. It has to press the Key to ON Display first, and other Keys can be used as normal. State of ON/OFF is not saved when Power-OFF.


7.5) HOW TO CHOOSE DISPLAY FORMAT WHILE POWER-ON

It can choose and setup any preferable display format to show on the Display after Power-ON or Reset; please go to Menu Conf --> Md:xx, choose the preferable Key, and then press Key  to Save the setting Key.

7.6) HOW TO RESET: When it is in any display mode, not Setup Mode, please press the Key  to reset.

7.7) HOW TO SHOW DISPLAY FORMAT ACCORDING TO SETTING VALUES: Please press any Key (Key 0-9, C, -, <<, >>, +, Test) to



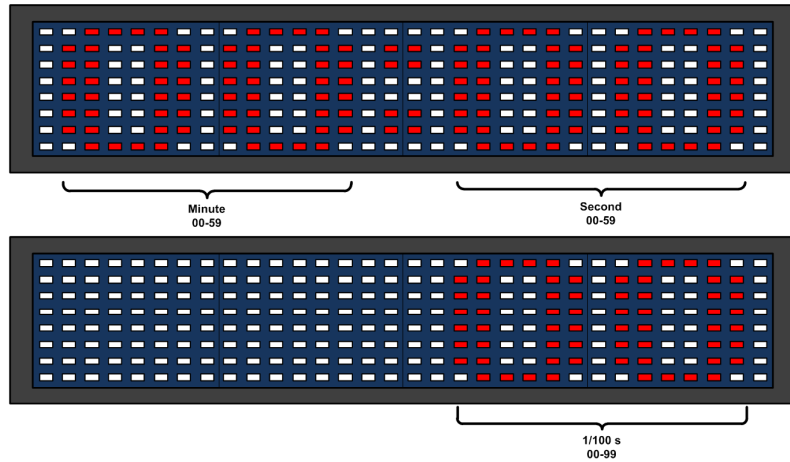
7.8) HOW TO SHOW CUSTOM-DISPLAY FORMAT: Please press Key  to show custom-display format that user setup in Menu **Config** in the Sub-Menu **Bd**:(show data on Lower-Display) and **Td**: (show data on Upper-Display)

7.9) HOW TO SHOW TEMPERATURE AND % OF HUMIDITY: Show value of Temperature and percentage of Humidity; in this case, it has to connect to Sensor Probe AM2301 to Connector Sensor Probe of the Clock first, and then provide power to the Clock. When the Clock is ready to receive Commands from Remote, please press Remote to choose the preferable Key that is setup to show the value of Temperature and percentage of Humidity such as Key C.

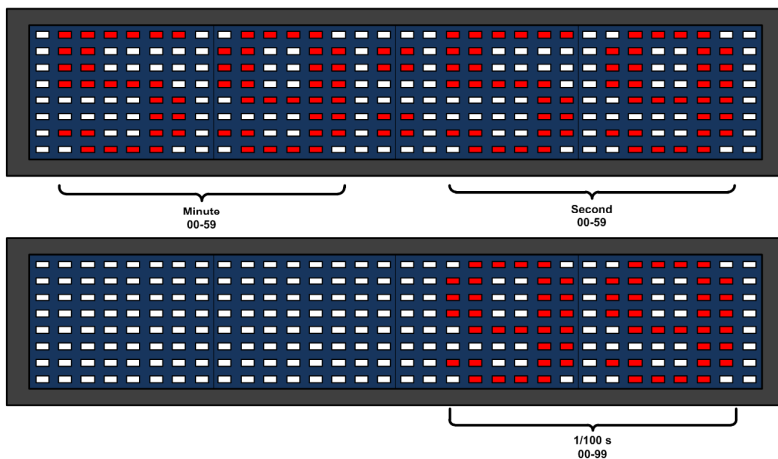
7.10) HOW TO USE STOP WATCH:

The display format of Stop Watch is arranged in an order of Minute (00-59): Second (00-59): 1/100 Second (00-99), respectively, with Resolution of 10mS. The maximum timing of Stop Watch is 60 minutes. When Key-9 is pressed, it enters Mode Stopwatch and the display screen shows the Start Time as 00:00:00. It can show the maximum timing as 59:59:99; when the Clock reaches this maximum timing, it stops timing automatically and it remains at the time value until user sends Command Clear.

DISPLAY TIME START = 00:00:00



DISPLAY TIME END = 59:59:99



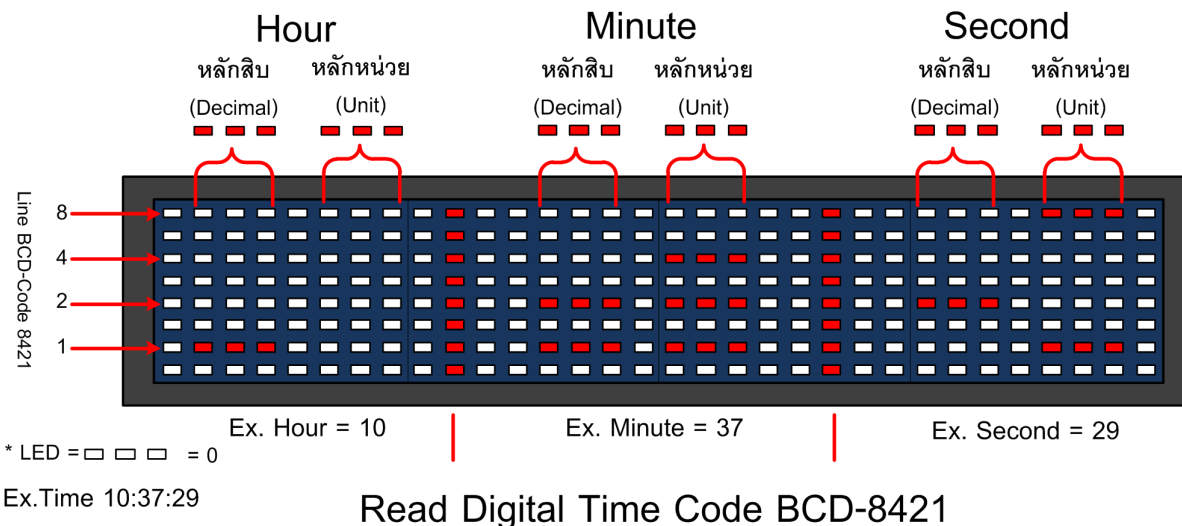


➤ HOW TO USE STOP WATCH

- 1) While it is running in any mode display, please press the Key **+** to enter Mode Stop Watch and the screen display shows the initial time as 00:00:00.
- 2) Press the Key **+** to start timing and Time starts running
- 3) Press the Key **+** again to stop timing
- 4) Press the Key **+** again to clear timing as 00:00:00. Next, press the Key **+** to start timing and Time starts running. The operation loops like this.

7.11) HOW TO READ CLOCK AS DIGITAL CODE BCD-8421

For Digital Code Display, user has to press Remote Key **-** and the picture below shows the format of reading Time value.



Referred to the picture above, it is divided into 3 sections and each section is replaced by unit of Hour, Minute, Second; each unit of the section consists of 2-digit number that is the tens-digit and digit; each digit is divided into 4 lines; and each Line has its own stationed number as shown in the picture below. When number in each digit is displayed, it is replaced with ON/OFF LED 3 Dot that is arranged in a horizontal line (in this case, 1 Line is replaced by ON/OFF LED 3 dot in horizontal line). In summary, a number in each digit can include a maximum of ON LED 4 dot in a specified position of Line as shown in the picture below;

When it reads time value, it has to read digit by digit. If position of any digit has no any LED ON, it assumes that it is zero; on the other hand, if position of any number digit has LED ON, it has to include the stationed number of each Line that is LED ON first and user will get the final number of the required digit. When it can read the numeric value in the tens-digit and digit successfully, please arrange numbers in an order; and finally, user will get the numeric values in each digit of Hour or Minute or Second as preferred. For example, please look at the digit of Minute in the picture above, there is 2-Line of LED ON and its stationed value is 1 and 2; so, the value in the tens-digit is 1+2=3. Next, please look at the digit's place in the picture above, there is 3-Line of LED ON and its stationed value is 1, 2 and 4; so, the value in the digit's place is 1+2+4=7. When numbers of both digits are arranged in an order, the numeric value of Minute is 37. For digit of Hour and Second, it also uses the same method to read value.