ET-Mini Clock4

ET-MINI CLOCK4 is Digital Clock with 4-DIGIT DOT MATRIX (8x32 DOT), and a numeral size per each digit is 3cm wide. It can show the Time, Date, and Temperature; moreover it can be used as Timer internal Clock. This Clock supports 2 sources of Time Base. Firstly, Time Base from internal Clock is RTC DS3231; and secondly, Time Base from External Clock is Module GPS that is connected via Connector RJ45 (**OPTION**: ET-GPS-RS422). In the part of GPS, it can setup Time Zone in the range of ±9 (Time Zone for Thailand is +7).

It can setup and choose various display formats for this ET-MINI CLOCK4; it can show Date, Time, Temperature, Humidity (it has to additionally connect ET-SENSOR AM2302); or, it is used as Timer; or, it shows flashing message "Open" or "Close"; or, it is used as Alarm Clock to ring at a particular time in the range of 0-23 hours. There is Buzzer to produce a sound of alarm and there is Channel of Alarm OUT in order to control operation of external device when Alarm happens.

ET-MINI CLOCK4 is controlled via IR Remote that is provided with Clock. There are 4 models as listed below;

- **ET-Mini Clock4** : With Lego Stand but No box, no voice for telling time
- **ET-Mini Clock4 Box** : A box with transparent acrylic, but no voice for telling time
- **ET-Mini Clock4 Plus** : With Lego Stand, voice from MP3 for telling time, but no box
- **ET-Mini Clock4 Box Plus** : A box with transparent acrylic and voice from MP3 for telling time

For the model Plus, Box Plus, there are additional features such as Speaker and Module MP3; so, user can hear the sound of Alarm for every hour, or user can press a key to listen to the current time. There are 2 languages for telling time; Thai and English.

1) SPECIFICATIONS OF ET-MINI CLOCK4

- SPECIFICATIONS OF ALL MODELS

- Clock uses POWER SUPPLY DC5V MINI USB or DC12V Type J (POWER SUPPLY 12V is supplied to Clock and GPS from external). For general use, the Current that is supplied at the full of light of Display is 300mA approximately; and the maximum Current at Full Load is 450mA approximately.
- Clock is controlled by MCU AVR EASY MEGA328
- GPS (ET-GPS-RS422) is connected via Connector RJ45; it is used as Time Base to display data. It can set Time Zone in the rage of ±9; or, it uses Time Base of RTC DS3231 internal Clock instead. The Clock always chooses Time Base from GPS automatically after Power-ON if it is connected.
- Clock receives all user's Commands via IR Remote (provided with device)
- IR Remote uses Battery 3V #CR2025 (included in set); and Clock uses Battery Backup 3V #CR2032 (included in set)
- Display is in the format of 4-Digit Dot Matrix (8x32 DOT) and it only shows the time in 24-hour clock.
- Choose various types of Display Mode; Date, Time, Temperature, and Humidity (**OPTION**: ET-SENSOR AM2302). Or, it is used to be Timer or display flashing message "Open' or "Close"; each display mode uses different Font.
- Be used as Alarm Clock that can be set to ring at a particular time (0-23 hours). There is Buzzer to produce ringing sound; and there is 1-CH Alarm Output that will be Signal Logic "1" when Alarm happens (Default Logic "0"). It can be connected to control external devices.
- If using Time Base from GPS, it always auto updates Date/Time of RTC (DS3231) internal Clock after Power-ON. Or, if using Time Base from RTC (DS3231) internal device, user can manually setup Time/Date by IR-Remote.
- ON/OFF and adjust 16-Level of brightness of Display (0-15), and including Reset Clock by IR-Remote

- Choose the Christian Era (A.D.) or the Buddhist Era (B.E.) (only display the last 2-Digit)
- Choose and setup preferable display of Key after Power-ON
- Temperature value can be displayed by positive quantity only and the Temperature value that is read by RTC DS3231 internal Clock has Error at ±3 degrees Celsius.
- Connector can be connected to external Sensor to measure temperature and humidity; it supports ET-SENSOR AM2302
- Connector receives Signal from Sensor or SW.TTL to control Start and Stop of Timer
- Connector 3PIN sends Data of the current Date and Time in the format of RS232 TTL; user can read and use this Data instantly.

- ADDITIONAL FEATURES OF MODEL BOX

- The box is made of transparent acrylic, the dimensions are 14 x5.8 x 4.8 cm (Width X Height X Depth);it can be hanged on the wall.

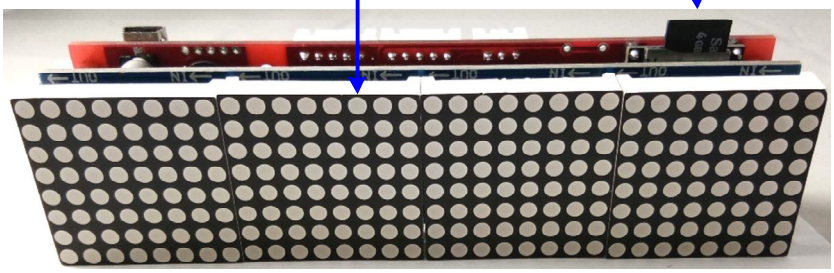
- ADDITIONAL FEATURES OF MODEL PLUS

- Add external Speaker with Cable (ET-SP Mini) and Clock provides Connector 2Pin to connect with speaker
- Add Module MP3 to play audio file for telling time with Micro SD Card included 2 languages of audio file (TH,EN)

- ADDITIONAL FEATURES OF MODULE MP3

  - Support File MP3, FAT16 and FAT32
  - Have internal extension with 3W, 30 levels of Volume Adjustment (adjusting the volume at Menu Conf of the Clock)
- Clock can tell time by voice every hour, including after Power-ON
- Choose 2 Languages; Thai and English. And disable all audio files for telling time (Mute)
- 30 levels of volume can be adjusted for telling time and alarm that is generated by Module MP3
- Press IR-Remote to listen to the current date or time
- Play/Stop/Next all audio files of MP3 in Micro SD Card (all files must be saved in Folder 03)
- Menu can be set to ring on the specified birthday of each year (Date, Month, Time (clock)) by playing the particular audio file of Alarm MP3
- Change audio file of Alarm (MP3) as required; in this case, the default Alarm Clock is cock-a-doodle-doos and default of birthday alarm is Happy Birthday song

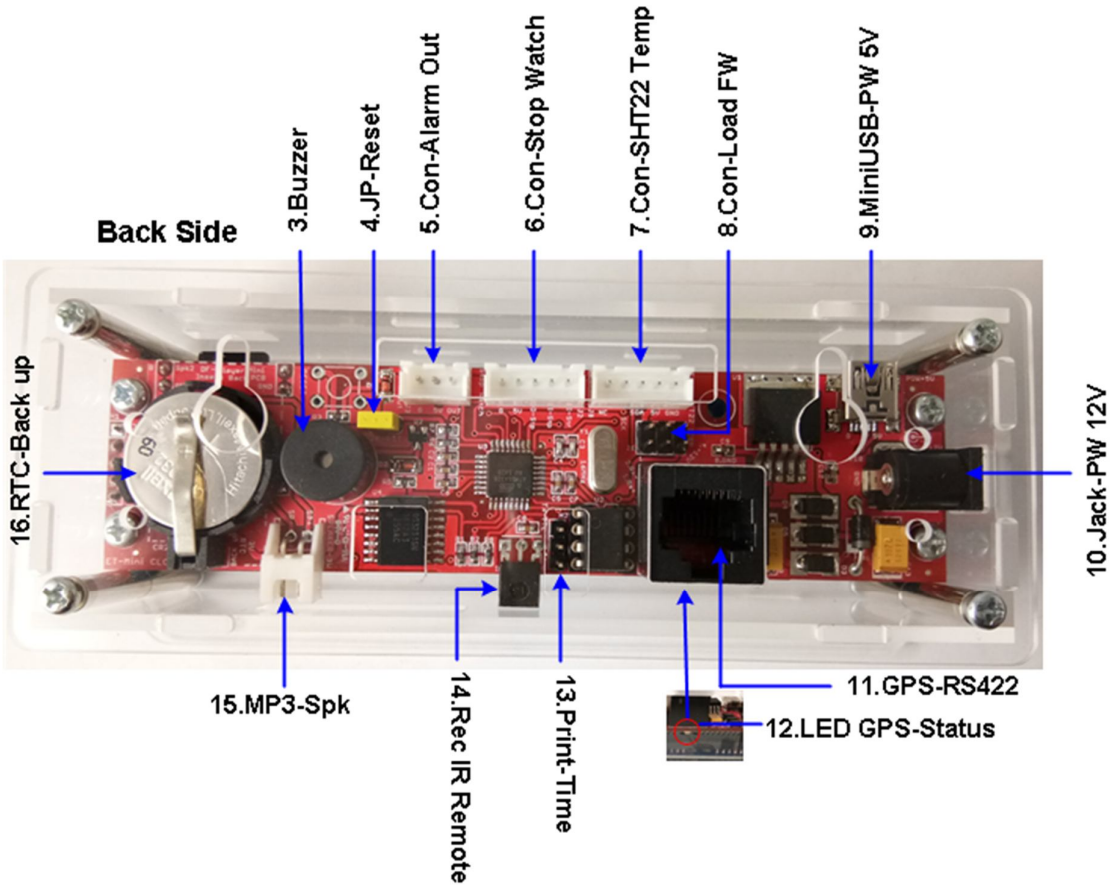
2) STRUCTURE AND CONNECTORS OF BOARD ET-MINI-CLOCK4



Front Side

B.Remote

A. ET-SP Mini



A.ET-SP Mini: It is speaker set with transparent acrylic box to tell time and other audio files that are played by Module MP3; it is only available for model Plus and Box Plus. It has to connect at Connector No.15.MP3-Spk of Clock.

B. Remote: It is IR Remote to control Display Mode and setting values for Clock; it uses Battery 3V #CR2025. This Remote is available for every model. More information of keys, please read Topic 4 Functions of Keys on Remote.

1. ***Display 8 x32:*** Display is 8x8 Dot Matrix with 4-Digits; this Display is totally 8x32=256 DOT. There are various type of display of the Clock that user can choose the preferable display mode from IR-Remote Key0-9, C, and Test.

2. ***Mp3+Micro SD:*** It is Module MP3 with Micro SD Card that contains audio file for telling time completely; it is only available for the model Plus and Box Plus. The main function is to produce sound to tell time or play audio files in Micro SD Card and it is connected to Speaker at Connector No.15. User can change or modify some part of audio file in Micro SD Card, please read Topic 6 How to use Et-Mini CLOCK4 for more information.

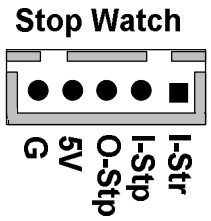
3. ***Buzzer:*** This Buzzer produces Beep sound when Alarm Clock rings, or when Key Remote is pressed each time.

4. ***Jp-Reset:*** This Jumper is connected between Pin RESET and Pin I/O of MCU; it can reset the Clock by Remote.

5. ***Con-Alarm Out:*** It is Connector Alarm Output. When Alarm does not happen yet, Pin OUT is Logic "0"; but, when Alarm happens according to the specified time, Pin OUT becomes Logic "1" (TTL = 5V) instead. It becomes Logic 0 again when user presses the Key Play(|>) to stop Alarm. Pins are arranged as follows;

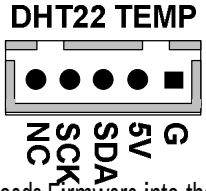
Out : Signal Alarm Active Logic 1 (5V)
5V,G : Power Supply 5V for External Device

6. ***Con-Stop Watch:*** This Connector receives Signal Input Logic (TTL=5V) from external to control Start and Stop of Stop Watch when using Mode Key 9. When the Display shows data in Mode Key9 as 00:00:00 and it sends Signal Logic "0" to Pin I-Str, it starts timing. While the Clock is timing and it sends Signal Logic 0 to Pin I-Stp, it stops timing instantly. When state of Stop happens, it also sends Logic "1" (TTL=5V) to Pin O-Stp of this Connector and this Pin O-Stp becomes Logic "0" when user presses Remote Key9 to clear the display mode to be 00:00:00 again. Signal Pins are arranged as follows;



I-Str: Input receives Signal Logic 0 to start timing.
I-Stp: Input receives Signal Logic 0 to stop timing.
O-Stp: Output sends Signal Logic 1 when it stops timing.
5V,G: Power Supply 5V for external device

7. ***Con-DHT22 Temp:*** This Connector is connected to Sensor to measure temperature and humidity of ETT "ET-SENSOR AM2302". Signal pins are arranged as follows;

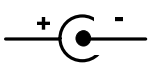


5V,G: Power Supply 5V for external device
SDA: Data Signal
SCK: Unused
NC: Unused

8. ***Con-Load FW:*** It downloads Firmware into the Clock; user can ignore this part.

9. ***Mini USB-Pw 5V:*** This Connector POWER MINI USB is connected to POWER SUPPLY 5V for the Clock; it can use POWER SUPPLY form PORT USB of PC; or from Adapter 5V with Mini USB Header.

10. ***Jack-PW 12V:*** This Connector Power Type J is connected to Power Supply 12V for supplying the Clock and it supplies to GPS though Connector RJ45. When using this Connector, it has to think of anode header and cathode header. Feature of Connector is shows below (it supports Power Supply from ETT).



NOTE: When connecting Power Supply to the Clock, please choose only one Connector, it must not connect both positions simultaneously.

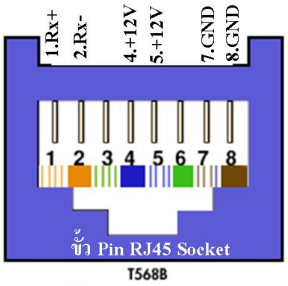
11. GPS-RS422: This Connector RJ45 is connected to Module GPS "ET-GPS-RS422" from ETT. Pin 12V of this Connector is pulled from Jack-PW 12V to supply to Module GPS; so, when using Power Supply 12V from this Connector to supply to Module GPS, it has to connect Power Supply to supply to the Clock through Connector Jack-PW 12V because the Clock can call and use Time Base from GPS. After connected GPS completely, please wait for 40 seconds and then reset the Clock by IR-Remote (Key-Return). Pin arrangement of Connector RJ45 that is connected to GPS is shown below. Please read Topic 6 How to use ET-MINI CLOCK4 for more information about connection.

Pin1. Rx+: Pin receives Data+ is connected to Tx+ of ET-GPS-RS422

Pin2. Rx-: Pin receives Data- is connected to Tx- of ET-GPS-RS422

Pin4,5. +12V: Power Supply is connected to ET-GPS-RS422

Pin7,8. GND: Ground for ET-GPS-RS422



12. LED GPS-Status: This LED shows state of running of Module GPS that is connected with; it flashes when using GPS.

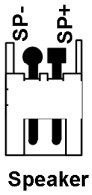
13. TX-TTL: This Connector RS232 TTL only uses Pin Tx to print Time values (Hour, Minute, Second) and Date values (Days of the week, Date, Month, and Year (depending on user to choose either the Christian Era or the Buddhist Era)) that are currently shown on the Clock, and user can read and use these values instantly. All values that are printed are in the format of decimal number and Command in row. For more information, please read Topic 6 How to use ET-Mini CLOCK4. Pin arrangement is shown below;

Tx: Pin sends data is connected to Pin Rx of MCU

+5V,GND: Power Supply for external load

14. Rec IR Remote: This IR receives Signal from Remote to control operation of the Clock.

15. Con-MP3 SPK: This is Connector Speaker of Module MP3 for telling time; it supports 3-Watt (it is only available for the model Plus and Box Plus).



16. RTC-Back Up: This Socket is to insert 3V Battery Back Up #CR2032 for RTC-DS3231; the Time Base will run as usual during the blackout.

3) HOW TO RUN ET-MINI-CLOCK4

It starts supplying Power Supply DC 5V or DC 12V to the Clock, the system reads Setting values from EEPROM internal MCU; for example, brightness of Display, Display Mode, Time Zone; and next, it checks if GPS is connected. If GPS is connected and it is ready to run (GPS starts running after POWER-ON for 40 seconds), it shows the message "GPS" on the Display for a while and user can hear the audio file say "GPS is ready" (it is only available for the model Plus, Box Plus). Next, program reads Time Base from GPS and it updates this Time Base for RTC DS3231 (it only updates the Time Base after Power-ON or Reset the Clock); and finally, the Display shows the message according to the chosen Mode Display of Key. If GPS is disconnected, the Display shows the message "RTC" for a while and user can hear the audio file say "RTC works" (it is only available for the model Plus, Box Plus); next the program reads Time Base from RTC DS3231 instead.

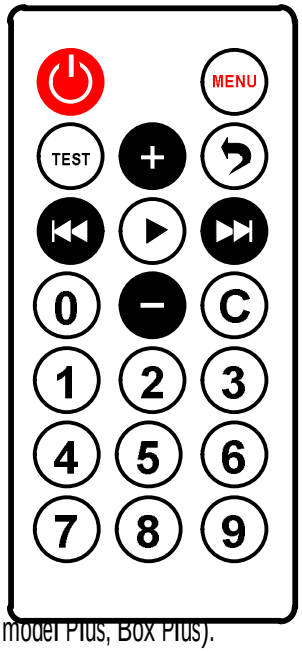
Next, program loops and waits for user to press Remote. If it is not pressed yet, it reads Time Base from GPS or RTC that is activated in order to update the Display value. If it is in Display Mode of temperature or humidity, program reads value of temperature and humidity from Sensor. Or, if Alarm is enabled, program always checks if it reaches the specified time of Alarm. If yes, Alarm commands Buzzer to produce interval Beep and it plays audio file of MP3 via Speaker (Only available for Model Plus, Box Plus).

While running in any Display Mode, user can press Remote to change the display mode to different formats as preferable. For more information, please read Topic 4 How to use Keys on Remote.

***NOTE**: When connecting to GPS, there is an effect on response of Remote because it is sometimes slower. Every time Reset or Power ON the Clock of the model Plus, Box Plus while playing the audio file to tell time, all numbers that shows time on the display are not changed until the voice ends.*

4) FUNCTIONS OF KEYS ON REMOTE

All models of ET-MINI-CLOCK4 only supports Command via IR Remote. Structure of Remote is shown on the right picture. Function of each Key is described below;



1) Key-Power [ ]: ON/OFF Display by Toggle Key Switch; when pressing the Key each time, it alternates between ON and OFF Display. While the Display is in the state of OFF, system internal the Clock still runs as normal but user cannot use any Key, except this Key POWER. After the Display is ON, other Keys can be used as normal.

2) Key-Menu [MENU]: Enter Setup Mode to setup values and exit Setup Mode to enter the normal display screen instantly. (Please read more information in Topic 5 Menu Mode Setup).

3) Key-Test [TEST]: Show the flashing message "Open" or "Close". Key is Toggle Switch type; when the Key is pressed each time, it alternates between 2 messages above.

4) Key-Up [+]: Play audio file MP3 in Micro SD Card contained in Folder '03' (only available for the model Plus, Box Plus). When it is in state of this Mode Setup Key, it moves 1 Main Menu or 1 Setup Values up each time, respectively.

5) Key-Return [ ]: Reset the Clock that looks like start the device, it has no any effect on user's Setup. When it is in this Mode Setup Key, it is used to returns to a previous Menu until it exits Mode Setup and becomes Key Reset again.

6) Key-Left [⏮]: Press the Key to listen to the voice telling the current time (only available for the model Plus, Box Plus). When it is in this Mode Setup Key, it is used to shift 1 Sub-Menu to the right side.

7) Key-Play [▶]: - Stop Alarm that is produced by Buzzer (Beep) and Speaker of Module MP3 (only available for the model Plus, Box Plus), including Reset Pin Alarm Out from Logic "1" to be Logic "0".

- Stop Alarm of birthday song from Speaker of MP3 (only available for the model Plus, Box Plus).
- Stop playing song file MP3 (contained in Folder '03') that is played by Key-Up (only available for the model Plus, Box Plus).
- When it is in Setup Mode, this Key is used to save all users' Setup in EE PROM and these values are used later.

8) Key-Right [⏭]: Press the Key to listen to the voice telling the current Date/Month/Year (only available for the model Plus, Box Plus). When it is in Setup Mode, this Key is used to shifts 1 Sub-Menu to the left side.

9) Key –Down [−]: While playing song file by MP3 in Folder '03' contained in Micro SD Card (only available for the model Plus, Box Plus) if user press this Key, it will play the next song file (Next). When it is in Setup Mode, this Key is used to move a Main Menu or Setup down, respectively.

10) Key-C [C]: Show Temperature on the Display in the unit of degree Celsius, its format is "TT.T "C". The value of temperature is mainly read from the external Sensor that is connected with first (ET-Sensor AM2302). If it is not connected with any external Sensor yet, it reads the value from Sensor internal RTC DS3231 of the Clock instead.

11) Key-0 [0]: Show percentage of Humidity on Display, its format is "HH.H %". It needs to connect ET-Sensor AM2302 from external to read the value. If it is not connected yet, it shows the value as " ----" on the Display instead.

12) Key-1 [1]: Show Time in the format of Hour, Minute on the Display, its format is "HH:MM". If using Alarm Clock, the display mode always be set in this Key Mode only and user can hear the alarm.

13) Key-2 [2]: Show Time in the format of Hour, Minute, and Second on the Display; its format is "HH:MM ss"

14) Key-3 [3]: Show Time in the format of Hour, Minute, and Second on the Display; its format is " hh:mm:ss "

15) Key-4 [4]: Show Date in the format of Date, Month, Year on the Display; its format is " dd.mm.yy ".

16) Key-5 [5]: Show Date in the format of Date, Month, Days of the week on the Display; its format is " DD.MM dd "

17) Key-6 [6]: Show Time, Date, Temperature on the Display; the Display loops and it alternately shows each data set for 10 seconds, its format is

Time **" HH:MM "** , Date " dd.mm.yy " , Temperature **" TT.T ºC "** , respectively

18) Key-7 [7]: Show Time, Days of the week-Date, Month-Year on the Display; the Display loops and it alternately shows each data set for 10 seconds, its format is

Time **" HH:MM "** , Day-Date **" Day,DD "** , Month-Year **" Mon,YY "** , respectively

19) Key-8 ***[(8)]:*** Show Temperature in degree Celsius, percentage of humidity; the Display loops and it alternately shows each data set for 10 seconds, its format is

Temperature **" TT.T ºC "** , Humidity **" HH.H % "** , respectively

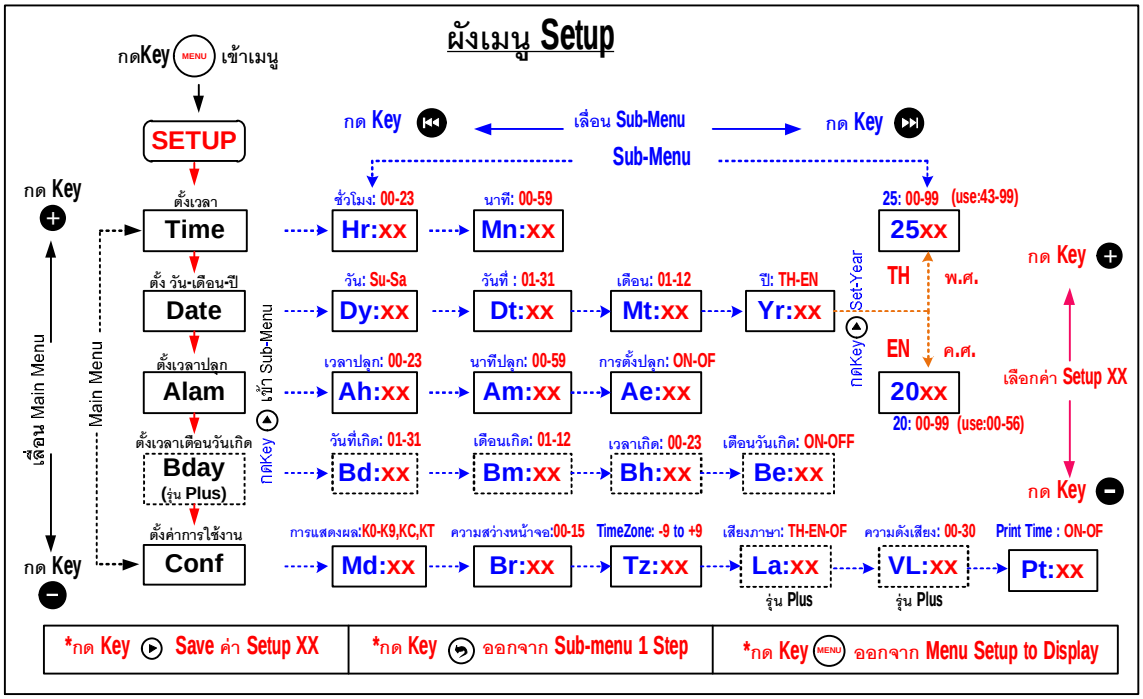
For Humidity, it needs to connect ET-Sensor AM2302 from external in order to read the value, otherwise, it shows the value as " ----" on the Display instead.

20) Key-9 ***[(9)]:*** This Key enters Timer Mode to Start, Stop, and Reset Timer all in one. The arrangement of running the Key is mentioned. For more information, please read the Topic 6 How to use ET-MINI Clock4.

NOTE*: Functions of each Key can be run when it is not in Mode Setup (it enters mode when pressing Key Menu). For Key Menu, Key Up, Key Down, Key Left, Key Right, Key Play and Key Return, these keys is be used together with Mode Setup.*

5. MENUS OF MODE SETUP AND HOW TO USE MENUS

This Setup Mode is to set values for using the Clock. When entering this Setup Mode, the available Keys are Key Menu, Key Up, Key Down, Key Left, Key Right, Key Play and Key Return. Function of each Key is described above. This Setup Mode consists of menus as shown in the diagram below;



Please look at the diagram of Menu above, it consists of 5 main Menus and sub-menus of each Main Menu are used to setup values. Abbreviation of sub-menu that is used to setup values means as follows;

Main Menu

Time: Set Time as Hour, Minute for Time Base RTC DS3231 (If using GPS, this Menu is auto setup after Power ON). Setting values are listed below;

Sub-Menus (Value of Second is set as 0 when saving the value)

Hr:xx (Hour) = Set Time in the format of 24-hour clock in the range of 0-23 hours

Mn:xx (Minute) = Set Time as minute in the range of 0-59 minutes

Date: Set Days of the week, Date, Month, and Year (can be used either the Christian Era (AD) or the Buddhist Era (BE)) for Time Base of RTC DS3231 (If using GPS, this menu is auto setup after Power ON). Setting values are listed below;

Sub-Menus

Dy:xx (Day) = Set Days of the week from Su-Su; when Su: Sunday, Mo: Monday, Tu: Tuesday, We: Wednesday, Th: Thursday, Fr: Friday, Sa: Saturday

Dt:xx (Date) = Set Date of Month in the range of 1-31

Mt:xx (Month) = Set Month in the range of 1-12

Yr:xx (Year) = Set Year; in this case, it can be either the Christian Era (AD) or the Buddhist Era (BE), the value that is chosen is display format of the Clock.

TH: Set Year to be the Buddhist Era 25xx (Default); the last 2-digit of BE can be set as 00-99 (should set the value as 43-99)

EN: Set Year to be the Christian Era 20xx; the last 2-digit of AD can be set as 00-99 (should set the value as 00-56)

***NOTE**: When setting value of year, RTC DS3231can run from AD 2000-2100 or BE 2543-2643. However, it should set year in the range of AD 2000-2056 or BE 2543-2599 because RTC runs correctly and the display format of both the Christian Era and the Buddhist Era will be accordant.*

Alam: (Alarm) To set Time or give alarm to ring at a particular time in each day; setting values are listed below;

Sub-Menus (Value of Second is set as 0 when saving the value)

Ah:xx (Alarm Hour) = Set Time as hour in the range of 0-23 hours to alarm

Am:xx (Alarm Minute) = Set Time as minute in the range of 0-59 minutes to alarm

Ae:xx (Alarm Enable) = Set status of Alarm. When

ON: Set Alarm as "Enable" to give an alarm,

OF: Set Alarm as "Disable" (Default)

Bday: (Birthday) This Menu is only available for the model Plus, Box Plus; it is use to set Alarm of birthday in each year. Setting values are listed below;

Sub-Menus (Value of Minute, Second is set as 0 when saving the value)

Bd:xx (Birth Date) = Set birth date in the range of 1-31

Bm:xx (Birth Month) = Set birth month in the range of 1-12

Bh:xx (Birth Hour) = Set Time of birth as hour in the range of 0-23 hours

Be:xx (Birthday Enable) = Set status of Alarm for Birthday. When

ON: Set Alarm of Birthday as "Enable",

OF: Set Alarm of Birthday as "Disable" (Default)

Conf: (Configuration) This Menu is used to setup the necessary values for the Clock; setting values are listed below;

Sub-Menus

Md:xx (Mode Display) = Choose display mode on the Display according to Keys on Remote; it can be set as K0-K9, KC, KT. After Power-ON, the Display always shows the chosen Key (Default=K1).

Br:xx (Brightness) = Set the brightness of Display in the range of 00-15 (00: dullest, 15: brightest), Default=03

Tz:xx (Time Zone) = Set Time Zone that has an effect on operation when using Time Base from GPS only; it can set the value in the range of -9 to +9 (Time Zone of Thailand is +7 (Default)).

La:xx (Language) = This Menu is only available for the model Plus, Box Plus to choose language to tell time via Speaker. When

TH: Thai Language (Default)

EN: English Language

OF: Mute, especially Power-ON, pressing Remote to listen voice and every hour

VL:xx (Volume) = This Menu is only available for the model Plus, Box Plus to adjust volume of Speaker in the range of 00-30 (00: Silent, 30: Loudest) (Default = 25)

Pt:xx (Print Time) = Set value for running the Command Print to print the value of Time and Date via Connector Tx-TTL. When

ON: Print value of Time and Date according to the setting Command's format throughout the operation.

OF: Do not print any value of Time and Date throughout the operation (Default)

***NOTE**: The values that are setup in each Menu, some values are stored in EEProm of MCU; it remains after Power-OFF and it will be called after Power-ON. Some values are setup for RTC DS3231 and it will be called after Power-ON. So, it needs to insert Battery Back-Up into the Clock and the all values that are setup for RTC still run correctly although Power-OFF.*

How to use Menu Setup Mode: Referred to the diagram of Menus above, it can summarize menus of Setup Mode as follows;

1) Press Key (MENU) to enter Setup Mode; the Display shows message "SETUP" for a while and enter the first Main Menu "Time".
2) Press Key (+) or Key (−) to choose the preferable Main Menu to set value.
3) After chose the Main Menu to set value completely, press Key (▶) to enter the sub-menu of the chosen Main Menu; the Display shows the first chosen sub-menu of the Main Menu.
4) Press Key (⏮) or Key (⏭) to choose the preferable sub-menu to set value.
5) After chosen the sub-menu completely, press Key (+) or Key (−) to choose and set the preferable value for the sub-menu.
6) After set the values for the sub-menu completely, press Key (▶) to save the value; next, the Display shows the tick sign at the setting position for a while and user will hear Beep sound twice, it means it can save the value successfully. Next, user can return to step No.4 to choose the other sub-menus and user can do the same as described above.

After set values for the sub-menu completely but user does not press any Key Save, all setting value is unchanged and not used after exited this Setup Mode. If user moves to other sub-menu and return the old one, all values is not updated, it is still the old. Summarily, every time user setup new value for any sub-menu but user does not press any Key Save, this is no any effect on the operation of the Clock.

***NOTE**: When pressing Key (▶) to save any sub-menu, it only saves the particular value of the sub-menu; it does not save whole sub-menus of Main Menu. So, every time users setup the preferable value for each sub-menu completely, it always press the Key to save the value for the particular sub-menu completely.*

The value that is related to Config will be saved and stored in EEProm, it remains although Power-OFF; it will be called and used after Power-ON. For the value of Time, Date, Alarm that is related to Setting Time (except setting Birthday), it will setup for RTC DS3231; in this case, it has to insert Battery Back-Up and RTC runs correctly although Power-OFF.

7) When user is being in any sub-menu and needs to return Main Menu in order to change any setting value in other Main Menu, please press the Key ↩ to move 1 sub-menu backwards until it reaches the Main Menu; and finally, user can do the same as mentioned in the step No.2.

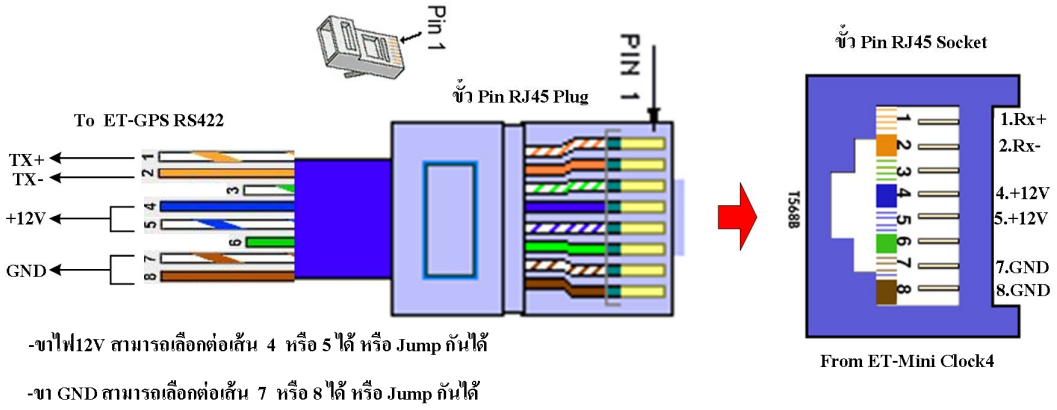
8) To exit Setup Mode, please press the Key ↩ repeatedly until it exits Setup Mode (Display returns the normal screen that shows time); or, user may press the Key MENU only one time, it exits Setup Mode instantly.

6. HOW TO USE ET-MINI CLOCK4

Now, it describes how to use ET-MINI CLOCK4; for example, setting values, connecting additional I/O devices to be used together with ET-MINI CLOCK4. In step of setting values for Sub-Menu, if user does not require editing or changing any value for the Sub-Menu, please press the Key ⏮ or Key ⏭ to skip the Sub-Menu and go to the next Sub-Menu instantly.

6.1) HOW TO USE TIME BASE FROM GPS (BE USED WITH ET-GPS-RS422)

1) Connect Cable RJ45 from the Clock to Module ET-GPS-RS422 as shown below;



***Pin 12V can be connected with Cable No.4 or No.5; or, it may be jumped together.**

***Pin GND can be connected with Cable No.7 or No.8; or, it may be jumped together.**

2) Provide 12V Power Supply to the Clock via Connector Jack-PW 12V (please check the connector correctly), it is used to be Power Supply for the Clock, Module GPS.

3) The Clock initiates and the Display shows the message ".RTC." for a while; user should wait for 40 seconds and GPS will be ready to work; and finally, press the Key ↩ to reset the Clock.

4) After reset the Clock completely, the Display shows the message ".GPS." for a while; and LED behind Connector RJ45 should be flashed to show state of running GPS. If no, user needs to press the Key ↩ again until the Display shows the message ".GPS." and LED is flashing.

5) Press Key MENU to enter Setup Mode and go to Main Menu : Conf --> choose Time Zone (Tz) according to the current country (TH= +7) and then save the value (The Default value is normally set as +7).

***NOTE**: Every time after Power-ON and it is connected with GPS, the Time Base that is read from GPS is always be used with Time Base of RTC DS3231. Time Base that is read from GPS will be shown on the Display in the format of Real Time.*

6.2) HOW TO USE TIME BASE FROM RTC

1) If it is connected to Cable RJ45 and GPS is used, please remove first.
2) Provide Power to the Clock at Connector MiniUSB-PW5 (for 5V POWER SUPPLY) or Jack-PW 12V (for 12V POWER SUPPLY), choose only one connector.
3) The Clock initiates and the Display shows the message ".RTC." for a while; it means that RTC is used.
4) Press Key (MENU) to enter Setup Mode to setup values for Time and Date correctly.

6.3) HOW TO SETUP TIME: This Setting Time has an effect on the use of Time Base from RTC DS3231, please follows these instructions as follows;

1) Press Key (MENU) to enter Setup Mode
2) Press Key (▶) to enter Main Menu: Time
3) Press Key (+) or Key (−) to set value of Hour (Hr :xx) in the format of 24-hour
4) Press Key (▶) to save the value of Hour
5) Press Key (⏭) to go to the next Sub-Menu to set Minute
6) Press Key (+) or Key (−) to set values of Minute (Mn :00-59)
7) Press Key (▶) to save the value of Minute
8) Press Key (MENU) to exit Setup Mode

6.4) HOW TO SETUP DATE: This Setting Date has an effect on the use of Time Base from RTC DS3231, please follows these instructions as follows;

1) Press Key (MENU) to enter Setup Mode
2) Press Key (+) to set value of Main Menu: Date
3) Press Key (▶) to enter Main Menu: Date
4) Press Key (+) or Key (−) to set value of days of the week (Dy :Su-Sa) Sunday-Saturday
5) Press Key (▶) to save the value of days of the week
6) Press Key (⏭) to go to the next Sub-Menu to set Date
7) Press Key (+) or Key (−) to set value of Date (Dt :01-31)
8) Press Key (▶) to save the value of Date
9) Press Key (⏭) to go to the next Sub-Menu to set Month
10) Press Key (+) or Key (−) to set value of Month (Mt :01-12)
11) Press Key (▶) to save the value of Month
12) Press Key (⏭) to go to the next Sub-Menu to set year
13) Press Key (+) or Key (−) to set value of year (Yr: TH= the Buddhist Era – EN= the Christian Era)
14) Press Key (▶) to save the format of year and the Display auto enters mode of setting year
15) Press Key (+) or Key (−) to choose and set the last 2-digit of year
    The Buddhist Era (25xx); the value of xx should be set in the range of 43-99
    The Christian Era (20xx); the value of xx should be set in the range of 00-56
16) Press Key (▶) to save the value of the last 2-Disgit of year
17) Press Key (MENU) to exit Setup Mode

6.5) HOW TO SETUP CONFIGURAION: It sets configurations for the Clock; please follow these instructions as follows;

1) Press Key (MENU) to enter Setup Mode
2) Repeatedly press the Key (+) until it found Main Menu: Conf
3) Press Key (▶) to enter Main Menu: Conf
4) Press Key (+) or Key (−) to set the format of display (Md : K0-K9,KC,KT)
5) Press Key (▶) to save the value of display format; it will always be used after Power-ON or RESET.

6) Press Key (⏭) to go to the next Sub-Menu to adjust brightness of display
7) Press Key (+) or Key (−) to set the brightness of Display (Br :00-15); when 00=Min, 15=Max
8) Press Key (▶) to save the value of display's brightness

9) Press Key (⏭) to go to the next Sub-Menu to set Time Zone; it has an effect on the use of Time Base from GPS
10) Press Key (+) or Key (−) to set value of Time Zone (Tz :-9 to +9). For Thailand, Time Zone is +7 (referring to the Greenwich Mean Time)
11) Press Key (▶) to save the value of Time Zone

12) Press Key (⏭) to go the next Sub-Menu to set language for telling a time (only available for the model Plus, Box Plus).
13) Press Key (+) or Key (−) to set language (La :TH-EN-OF); when TH = Thai, EN = English, OF = Mute
14) Press Key (▶) to save the value of language for telling a time.

15) Press Key (⏭) to go to the next Sub-Menu to adjust volume of Speaker (only available for the model Plus, Box Plus).
16) Press Key (+) or Key (−) to set volume of Speaker (VL :00-30); when 00 = Min, 30 = Max.
17) Press Key (▶) to save the value of volume via Speaker.

18) Press Key (⏭) to go to the next Sub-Menu to set values for Print Time (sending Data Time, Data via Connector Tx-TTL).
19) Press Key (+) or Key (−) to set the value of Print Time (Pt : ON -OF); when ON = Sending data, OF: Not send any data.
20) Press Key (▶) to save the state of running Print Time
21) Press Key (MENU) to exit Setup Mode

6.6) HOW TO ON/OFF DISPLAY

It can do by pressing the Key (⏻) ; when pressing the Key first time, it is OFF Display; but, when pressing the Key again, it is ON Display instead. Moreover, when using this Key, the Display must be in the normal display mode according to Key-Display. While OFF Display, internal system of the Clock still runs normally but user cannot press any key, except Key (⏻) to ON Display only. However, it does not recognize any state of ON/OFF after the blackout. If any Alarm happens while it is OFF Display, there is no any Alarm via Buzzer, Speaker or related Connector.

6.7) HOW TO SETUP DISPLAY FORMAT

User can set preferable values to be shown on the Display and the Display will show setting values after Power-ON. The display format is setup according to Keys on Remote; Key0-Key9, Key-Test, Key-C. User can setup Keys for this display format, please go to Main Menu-Conf /Sub Menu-Md:xx (please read more information at Configuration).

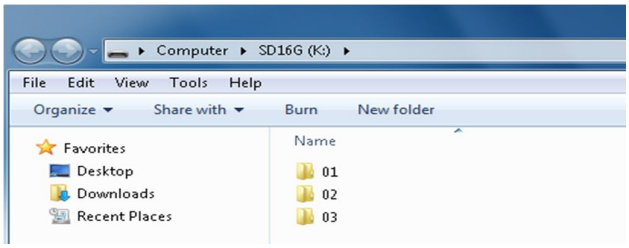
6.8) HOW TO COPY FILE MP3 INTO MICRO SD CARD (FOR MODEL PLUS, BOX PLUS)

It is only available for the model Plus, Box Plus. Normally, the audio file that tells time has already been copied to Micro SD Card completely and it is ready to use. There are 3 Folders in Micro SD Card as listed below;

Folder '01': Store audio files for telling a time in Thai, Alarm, and birthday's song; file surname is .mp3.

Folder '02': Store audio files for telling a time in English, Alarm, and birthday's song; file surname is .mp3.

Folder '03': Store favorite lists of song; file surname is .mp3.



Picture shows Folders in Micro SD Card.

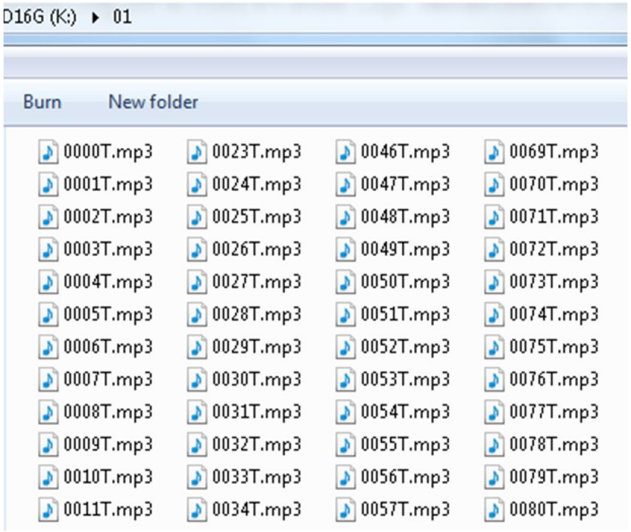
NOTE: *- Not allow editing any Folder names, otherwise these audio files are played incorrectly.*

- Not allow deleting and changing any file name in Folder 01,02. However, it can change sound of Alarm and alarm of birthday as requires; for more information, please read the topic How to setup Birthday Alarm and How to use Alarm.

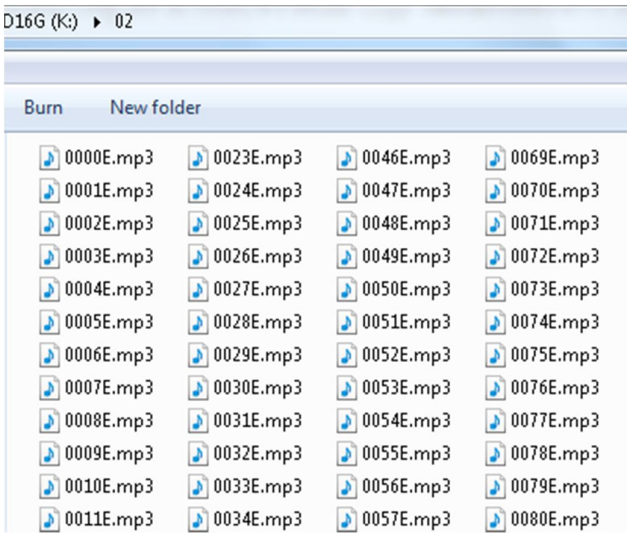
- For Folder 03, there is an example audio file song, user can delete and copy the favorite audio file song into the folder, without modifying.

If Micro SD Card is damaged; or, user requires changing new Micro SD Card, please copy all 3 Folder and paste them into the new CD. Please follow these instructions.

1) Insert Micro SD Card with 1G-16G into PC and format it as FAT32.
2) Copy Folder "01" , "02" and "03" into Micro SD. Please check if internal Folder "01" and "02" has file mp3 as shown in the picture below;



Example files internal Folder "01"



Example files internal Folder "02"

3) If user requires adding more favorite file songs, please copy songs into Folder "03" instantly. The example song files internal Folder can be deleted. The first file that is copied into this Folder will be played first when the Command Play is enabled.
4) Remove Micro SD Card from PC; insert into the socket of Clock; and finally, reset the Clock.

6.9) HOW TO PLAY SONG FILE MP3 (MODEL PLUS, BOX PLUS)

It is only available for the model Plus, Box Plus. Before using the device, it has to connect to Speaker, insert SD Card into the Clock completely; and Folder "03" must have file song for playing. If no, it has to copy and paste file song into the folder completely as described above. Please follow these instructions to play file song;

1) Power-ON the Clock and setup it to be in normal display mode according setting Keys on Remote.
2) Press Key (+), the first file song that is copied and pasted in Folder "03" will be played first. Remember, every time user presses this Key (+), it always starts playing the first file song, not play at any paused or stopped file song.
3) Press Key (−) to play the next file song (Next).
4) Press Key (▶) to stop playing the current file song.
5) Adjust volume of Speaker, go to Mode Setup ---> Main Menu -Conf ---> Sub Menu -VL:xx
6) All files are played repeatedly; after the last file song is played completely, it loops and restarts playing the first file song.

***NOTE**: While Alarm or birthday song happens, user cannot play any file song, it has to press Key (▶) to stop the Alarm first. While playing file song and Alarm happens, it stops playing the current file song and Alarm continues playing instead.*

6.10) HOW TO LISTEN TO TIME&DATE (MODEL PLUS, BOX PLUS)

It is only available for the model Plus, Box Plus. It has to connect to Speaker; insert Micro SC Card that contained audio file for telling time completely (the audio file is included in the Folder "01" and "02"); and Clock has to be in the normal display mode according to setting Key on Remote. For the value of Config in the Sub-Menu La:xx, it must be set as TH or EN; and VL:xx must not be set as 0. Next, press the Key (⏮) to listen the current time, or press Key (⏭) to listen to the current Date/Month/Year (if Alarm suddenly happens, it cannot use this part; in this case, it has to stops the Alarm first).

6.11) HOW TO SETUP ALARM FOR BIRTHDAY (MODEL PLUS, BOX PLUS)

It is only available for the model Plus, Box Plus because Alarm is played via Module MP3 and Speaker only. First of all, it has to connect to Speaker and insert Micro SD Card that contained audio file of Alarm for Birthday completely (normally, it is contained in the Folder "01" and "02" [file name 0150_BirthDay.mp3] completely; it is melody of Happy Birthday song). Next, please follows these instructions;

1) Press Key (MENU) to enter Setup Mode
2) Repeatedly press the Key (+) until it found Main Menu : Bday
3) Press Key (▶) to enter Main Menu : Bday
4) Press Key (+) or Key (−) to setup birth date (Db :01-31)
5) Press Key (▶) to save the birth date
6) Press Key (⏭) to go to the next Sub-Menu to set birth month
7) Press Key (+) or Key (−) to setup birth month (Bm :01-12)
8) Press Key (▶) to save the birth month

9) Press Key ⏭ to go to the next Sub-Menu to set birth time
10) Press Key + or Key − to setup birth time (Bh : 00-23)
11) Press Key ▶ to save the birth time

12) Press Key ⏭ to go to the next Sub-Menu to setup state of running Alarm Birthday
13) Press Key + or Key − to setup state of running Alarm Birthday(Be :ON-OF); choose ON = Enable Alarm
14) Press Key ▶ to save the state of running Alarm Birthday
15) Press Key MENU to exit Setup Mode
16) After exited the Setup Mode, the Clock must be in any display mode of Key1-Key7 in order to hear the Alarm. If Alarm happens but the Clock is in other display modes, user does not hear any Alarm until the Clock returns this display mode.
17) It can stop this Alarm, press Key ▶. If user does not press any key to stop the Alarm, it is sounded for an hour and auto stops.

***NOTE**:*

- *While Alarm Birthday happens but there is notification of telling time (every hour); or, the display mode is changed to other mode that is not Key1-Key7, the voice of Alarm Birthday is suddenly paused. It will be sounded again when the interrupted sound ends or the display mode is changed to Key1-Key7.*
- *While Alarm Birthday happens but Alarm suddenly happens, Alarm Birthday stops immediately and it is not sounded on anymore until it reaches the specified date in next year.*
- *The Setting Value of Alarm Birthday still remains although it is blackout.*

HOW TO CHANGE AUDIO FILE FOR ALARM BIRTHDAY

Please follow these instructions to change audio file for Alarm Birthday as required;

1) Edit and rename new audio file MP3 as *0150_BirthDay.mp3* first; all letters must be strictly written like the pattern.
2) Remove Micro SD Card from the Clock and then insert into socket of PC.
3) Copy the audio file MP3 as mention in step No.1 and pastes it into the Folder 01 or 02 in Micro SD Card. The new audio File MP3 that is copied will be replaced the old one in Folder 01 or 02.
4) Insert the Micro SD Card into socket of the Clock and reset the Clock

6.12) HOW TO SETUP ALARM CLOCK

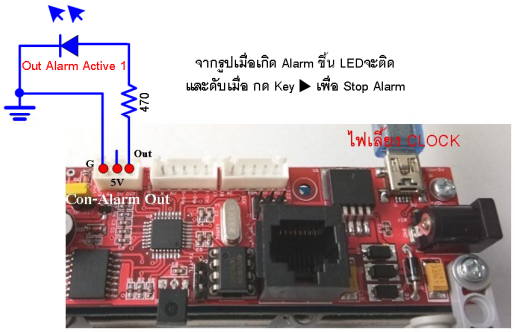
When Alarm Clock reaches the specified time, there are 2 ways that the Clock can produce a sound; firstly, Beep sound is sounded via Buzzer; and secondly, cock-a-doodle-doo is sounded via Module MP3 Speaker. So, if using Clock of the model Plus, Box Plus, user can hear the sound from both channels; but, if using Clock of the normal model, user can hear Beep sound via Buzzer only. For the model Plus, Box Plus, it needs to connect Speaker and insert Micro SD Card that contained the audio file for Alarm completely (normally, it is contained in the Folder "01" and "02" in the File name 0140_Alarm.mp3). Moreover, while Alarm happens, the Clock sends state of Alarm as Logic 1 (5V-TTL) to Pin Out of Connector Alarm Out and it remains this state for a while; it can use this signal to control external devices. Please follow these instructions to setup Alarm Clock;

1) Press Key MENU to enter Mode Setup
2) Repeatedly press Key + until it found Main Menu : Alam
3) Press Key ▶ to enter Main Menu : Alam
4) Press Key + or Key − to setup Alarm as hour (Ah :00-23)
5) Press Key ▶ to save the value of hour for Alarm

6) Press Key ⏭ to go to the next Sub-Menu to setup value of minute for Alarm
7) Press Key + or Key − to setup the value of minute for Alarm (Am :00-59)
8) Press Key ▶ to save the value of minute of Alarm

9) Press Key ⏭ to go to the next Sub-Menu to setup state for running Alarm Clock
10) Press Key + or Key − to setup state for running Alarm Clock (Ae :ON-OF); choose ON = Enable Alarm
11) Press Key ▶ to save the state running Alarm Clock
12) Press Key MENU to exit Setup Mo

13) When exits Setup Mode, the Clock must be in the display mode of Key1 because user can hear alarm sound when the Alarm happens. If the Clock is in other display mode, user does not hear any alarm until it returns the display mode of Key1. While Alarm happens, the Clock sends the state of Alarm as Logic '1' (5V-TTL) to Pin Out of Connector Alarm Out; so, it can use and modify this signal as required. The diagram below shows an example of use.



14) Please press Key ▶ to stop Alarm sound from both Buzzer and Speaker (the model Plus, Box Plus) and it also clears the state of Alarm at Pin Out of Connector Alarm Out to become Logic '0' instead.

NOTE:

- *While Alarm sound is happening but there is notification of telling time every hour, or the display mode is changed to other that is not Key1, the Alarm sound is paused. The Alarm is sounded again when the interrupted sound ends; or, the display mode is changed to Key1. For state of Alarm at Pin Out, it is still Logic 1.*
- *While Alarm is happening but the Alarm Birthday suddenly happens, the Alarm sound stops immediately and state of Alarm at Pin Out will be cleared to be Logic 0; the state is the same as pressing Key ▶ . This Alarm sound happens again when it reaches the specified time of the next day, except user disables the Alarm.*
- *The setting value of Alarm Clock is set for RTC DS3231; user has to insert Battery Back Up into the Clock and all the setting values still remain although it is blackout.*

HOW TO CHANGE AUDIO FILE FOR ALARM CLOCK (MODEL PLUS, BOX PLUS)

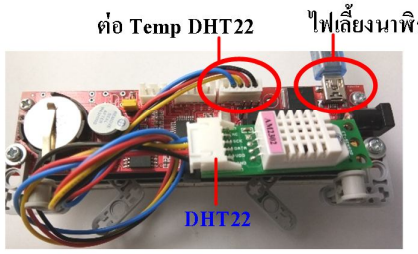
Please follow these instructions to change audio file for Alarm Clock as required;

1) Edit and rename new audio file MP3 as *0140_Alarm.mp3* first; all letters must be strictly written like the pattern.
2) Remove Micro SD Card from the Clock and then insert into the socket of PC.
3) Copy the audio file MP3 as mention in step No.1 and pastes it into the Folder 01 or 02 in Micro SD Card. The new audio File MP3 that is copied will be replaced the old one in Folder 01 or 02.
4) Insert Micro SD Card into socket of the Clock and reset the Clock.

6.13) HOW TO USE TEMP SENSOR DHT22 (ET-SENSOR AM2302)

This Module Temp DHT22 measures temperature and percentage of humidity (%) from external; the Clock reads and shows the value on the Display. Please follow these instructions;

1) Connect Temp Sensor DHT22 at the Con-DHT22 Temp that is Box 5-Pin as shown in the picture below;



2) Connect Power Supply 5V or 12V to the Clock according to user's requirement.
3) When the Clock enters the normal display mode, press the Key (C) to see the display of temperature and press the Key (0) to see the display of percentage of humidity (%), or press the Key (8) to see both results alternately.

If it does not connect to any Temp DHT22, the Display does not show any data in the part of percentage of humidity (%); but it still shows the value of temperature. The Clock reads the temperature value of Temp Sensor that is embedded in RTC DS3231 and auto shows the value on the Display.

6.14) HOW TO USE PRINT TIME

Time and Date that is used by the Clock to show on the Display will be it is sent via Connector Tx-TTL in the format of Serial RS232, with the Baud Rate 9600. User can read this Time and Date and uses them as required. Data that is sent out is arranged in the format of Command as follows;

Respond Command Data 9 Byte For Time & Date

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start	Hour	Minute	Second	Day	Date	Month	Year	End
' $ '	0-23	0-59	0-59	1 - 7	1 - 31	1 - 12	0 - 99	' # '

Referred to the Table of Respond Command above, the Command Data that is sent out each time is 9-Byte.
The first Byte is Byte0 that is Byte Start; follows by data of Time and Date; and finally, the last Byte is Byte8 that is Bye End of the Command Set as descried below;

Byte0: Start Byte : It sends the Data in the format of ASCII '$' or 36 (Dec) or 0x24 (Hex)

Byte1: Byte of Hour : It sends the Data in the format of decimal number: 0-23 or Hex: 0x00- 0x17

Byte2: Byte of Minute : It sends the Data in the format of decimal number: 0-59 or Hex: 0x00-0x3B

Byte3: Byte of Second : It sends the Data in the format of decimal number: 0-59 or Hex 0x00-0x3B

Byte4: Byte of Days of the Week : It sends the Data in the format of decimal number: 1-7 or Hex: 0x01- 0x07 (Sunday-Saturday)

Byte5: Byte of Date : It sends the Data in the format of decimal number: 1-31 or Hex: 0x01-0x1F

Byte6: Byte of Month : It sends the Data in the format of decimal number: 1-12 or Hex 0x01-0x0C

Byte7: Byte of Year : It sends the Data in the format of decimal number: 0-99 or Hex 0x00-0x63. This is the last 2-Digit of year that can be either the Christian Era (BE) or the Buddhist Era (AD), depending on user's selection

Byte8: End Byte : It sends the Data in the format of ASCII ' # ' or 35 (Dec) or 0x23 (Hex)

Example:

If it is the Time 08:09:10 Sunday, 09 January, 2560 B.E.; Respond Command is **DEC: 36 08 09 10 01 09 01 60 35**; or,

Hex: 0x24 0x08 0x09 0x0A 0x01 0x09 0x01 0x3C 0x23

If it is the Time15:30:05 Wednesday, 21 October, 2017 A.D.; Respond Command is **DEC: 36 15 30 05 04 21 10 17 35**; or,

Hex: 0x24 0x0F 0x1E 0x05 0x04 0x15 0x0A 0x11 0x23

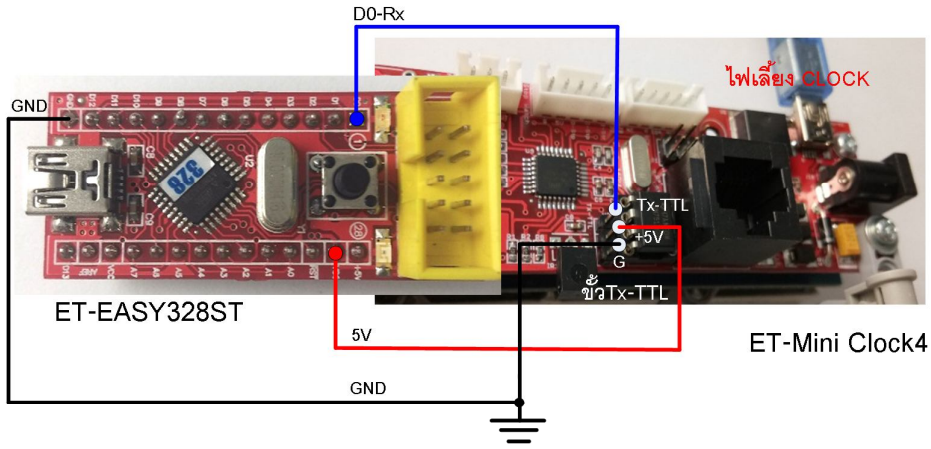
If it is the Time23:10:52 Saturday, December, 2009 A.D.; Respond Command is **DEC: 36 23 10 52 07 10 12 09 35**; or,

Hex: 0x24 0x17 0x0A 0x34 0x07 0x0A 0x0C 0x09 0x23

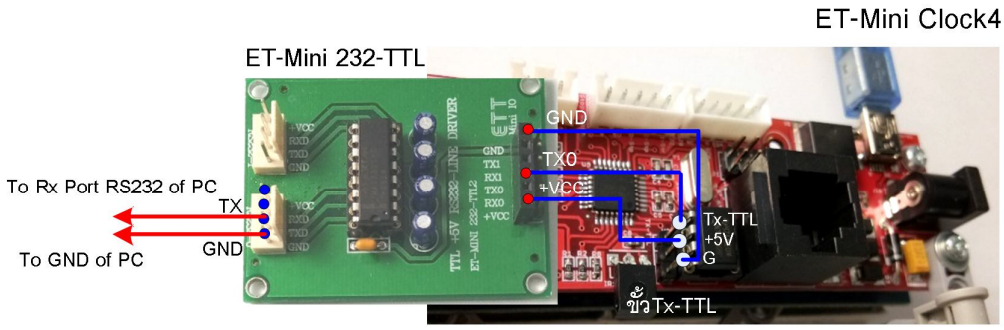
Please follow these instructions for using this function;

1) Connect Signal Pin from Connector Tx-TTL of the Clock; in this case, there are 2 ways as described below;

- **Type 1**: Be connected to Pin Uart Rx of MCU directly because Signal Data in this part is TTL as shown in the picture below;



- **Type2**: Be connected via IC Line Driver Max232. In this case, it refers to Board Line Driver ET-MINI 232, user can connect OUTPUT of Board ET-MINI 232 with Board MCU that is connected Pin Uart via Line Driver; or, it is connected with Port RS232 (Connector DB9) of PC to see data that is Print via Program Terminal as shown in the picture below;



2) Provide 5V or 12V Power Supply to the Clock and the Clock starts running.

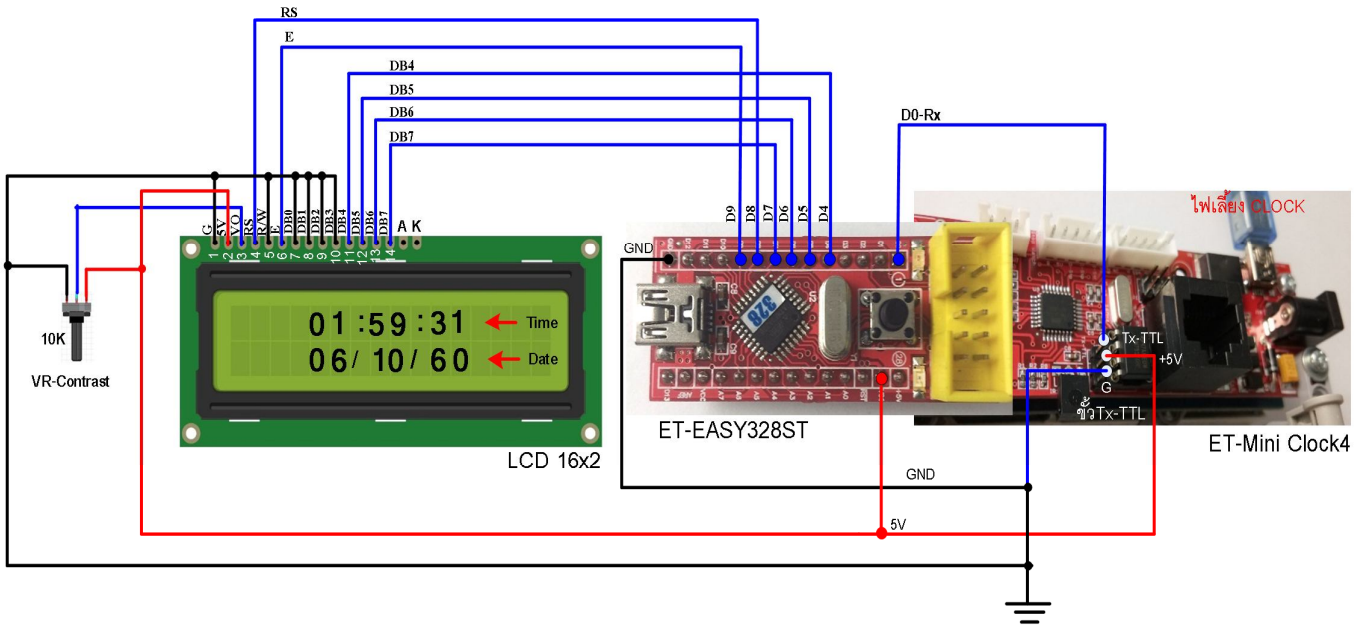
3) Press Key (MENU) to enter Mode Setup ---> Main Menu - Conf ---> Sub Menu - Pt:ON; it has to set the value of Pt as ON.

4) Exit Setup Mode, and then choose Display Mode related to Time or Date (using the display mode of Key1-Key7)

5) In the meantime, Connector Tx-TTL is printing values of Time and Date all the time according to the format of Command as mentioned above, with Baud Rate 9600. However, time and speed for printing each Command Set is highly unstable because of variable factors; for example, setting Display Mode, setting Time Base, or setting values for Alarm. All factors have an effect on the operation. To solve these unstable events, user should write program and then setup MCU to read data via Uart by using Interrupt.

6) Write program to read values from user's MCU; it uses Baud Rate at 9600.

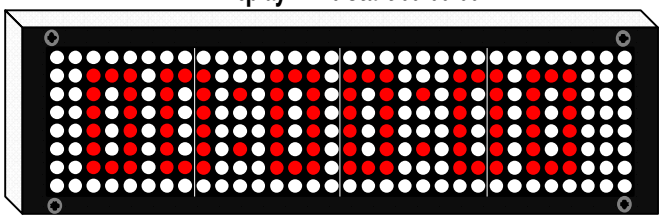
Example program for reading this Time value is included in the Folder name " Ex_RdTimeLCD "; it uses Board Arduino ET-EASY3288T and it connects Pin Tx-TTL with Pin RX of MCU directly. The operation of program loops and waits for reading Package Command of Time&Date that is sent out. It checks the Package Command by Byte Start '$' and Byte End '#'; next, data of Package Command that is read each time will be shown on 16x2 LCD Display; Line1 shows Time and Line2 shows Date. Please look at diagram below, it shows how to connect the circuit and test the example program (it uses Baud Rate 9600).



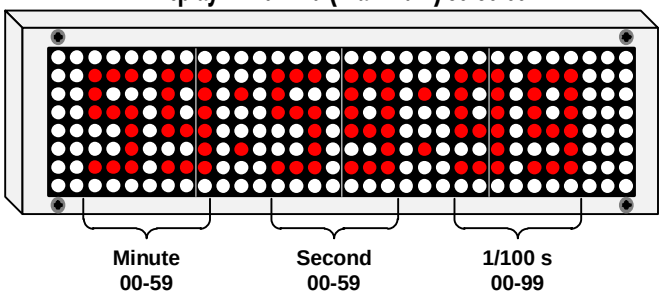
6.15) HOW TO USE STOP WATCH

The Display of Stop Watch is shown in the format of Minute(00-59): Second(00-59):1/100 Second(00-99), respectively; the Resolution is 10ms and the maximum of timing is 60 minutes. When pressing Key-9 to enter Mode Stopwatch, the Display shows Start Time as 00:00:00 and the maximum timing is at 59:59:99. When the timing reaches the maximum value, the Clock auto stops and remains at this value. Moreover, while the timing is stopped, the Clock also sends Signal Logic '1' or 5V to Connector Stop Watch (Connector Block 5Pin) Pin O-Stp; this Signal can be used to control devices as required. Signal Logic at this Pin will be cleared to be 0 when the remained Time value of Stop on the Display is cleared completely.

Display Time Start 00:00:00



Display Time End (Maximum) 59:59:99



Picture shows the Start Time and the Maximum Time of Stop Watch.

There are 2 methods to use this Stop Watch, user can properly choose as described below;

- **HOW TO USE STOP WATCH BY REMOTE KEY-9**

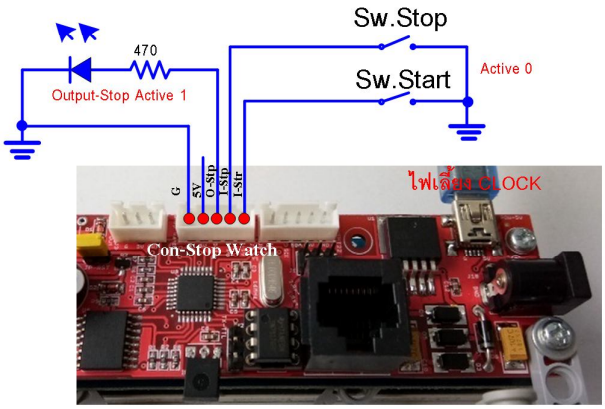
1) While it is in any Display Mode, please press Key-9 to enter Stop Watch; the Display shows the initiate value as 00:00:00 and Output at Pin O-Stp will be set as Default value at Logic '0'.
2) Press Key-9 to start timing and Clock starts running.
3) Press Key-9 again to stop timing and Output at Pin O-Stp will be set as logic "1'.
4) Press Key-9 again to clear the timing to be 00:00:00 and Output at Pin O-Stp will be cleared to be Logic '0'; next, press Key-9 to start timing. The operation loops and runs as mentioned above.

When pressing Key-9 from the step No.2 and so on, user has to press the Key-9 while it is in Stopwatch Mode and it will has an effect on the operation as mentioned above. While timing or stop timing, user can press any Key to go to other Display Modes; user only presses the Key-9 again to return the Stopwatch Mode. After returned the Stopwatch Mode, the timing is still running and the result of Stop Time still remains until user presses the Key-9 to change the display in Stopwatch Mode.

- **HOW TO USE STOP WATCH BY REMOTE KEY-9 TOGETHER WITH EXTERNAL SWITCH OR SENSOR**

The second method is to use Remote Key-9 that is the same as the first method mentioned above; but, it only uses Key-9 to enter Mode Stopwatch and clear timing; and it uses external SW. or Sensor to Start Timing and Stop Timing instead. So, user can modify and apply for various purposes. Please follow these instructions below;

1) Connect SW. or Sensor (O/P Active Logic 0 TTL) to Connector Stop Watch at Pin I-Str (input Start) and I-Stp (Input-Stop), please look at the example of connection below;



Input that is connected with Pin I-Str is used as Switch Start for timing; and Input that is connected with Pin I-Stp is used as Switch Stop for timing. Both Inputs are pulled up inside at 5V; so, it has to send Logic '0' to control Start or Stop instantly. The Logic '0' should be temporarily trigger as same as push-button Switch.

2) If it requires using Signal Logic Output of Stop, please connect Signal at Pin O-Stp (Output-Stop).
   If it is in normal state, this Pin is Logic '0'; but Pin becomes Logic'1' for a while if Stop Timing and it becomes Logic '0' when pressing Remote Key-9 to clear the timing as 00:00:00.
3) After connected I/O device completely, press Remote Key-9 to enter Mode Stop Watch and the Display shows the initiate value as 00:00:00. Output at Pin O-Stp will be set as Default value as Logic '0'.
4) Send Signal Logic '0' to trigger Pin I-Str to start timing and the Clock starts running.
5) Send Signal Logic '0' to trigger Pin I-Stp to stop timing and Output at Pin O-Stp will be set as Logic '1'.
6) Press Remote Key-9 to clear timing as 00:00:00 and Output at Pin O-Stp will be cleared as Logic '0'. The Clock waits for receiving Signal Trig at Pin I-Str to start timing again.

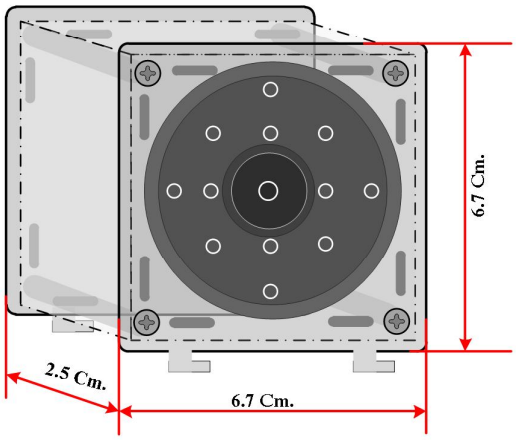
6.16) HOW TO CHANGE LANGUAGE OF AUDIO FILE FOR TELLING TIME (ONLY MODEL PLUS, BOX PLUS)

Thcrc arc 2 languagcs of audio filc for tclling timc; Thai and English. Plcasc go to Mcnu Conf - ->La:xx to choosc and sctup the preferable language. If choosing TH (Thai), the Clock pulls the audio file from the Folder '01'; but if choosing EN (English), the Clock pulls the audio file from the Folder '02' instead. When user understands this basic theory, user can change preferable language of audio file for telling time; or, user may change some part of audio file by inserting your own voice, please follow these instructions;

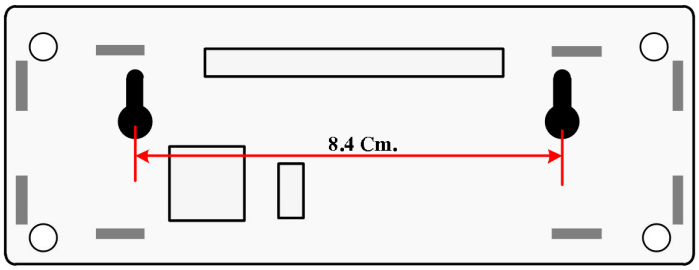
1) Remove Micro SD Card from the Clock and insert into the socket of PC; next, click to listen to the audio file MP3 in Folder 01 or 02. In this case, user should choose the Folder of the audio file correctly according to the setting language.
2) Rename name and surname of the preferable audio file MP3 as same as the audio file in Folder 01 or 02.
3) Copy and paste the audio file MP3 that has been renamed completely in the Folder 01 or 02 internal Micro SD Card. This new audio file MP3 will replace the old one in the Folder 01 or 02 according to user's selection.
4) Insert Micro SD Card into the Clock and then reset the Clock.
5) If user requires changing a whole file to other language, amount of new audio file that is recorded must be the same as the old one in the Folder. Next, rename name and surname of the new audio file according to the old one; and finally, copy and paste the new audio file to replace the old one in Folder.

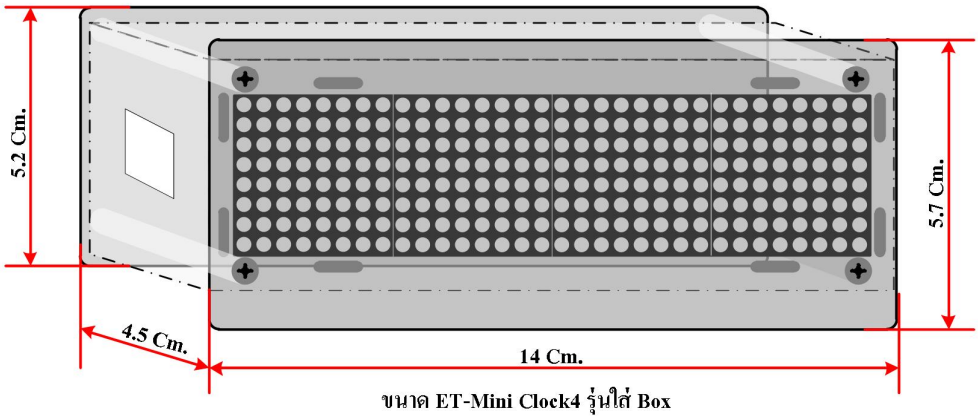
///----------END ----------///

ขนาด ET-SP Mini

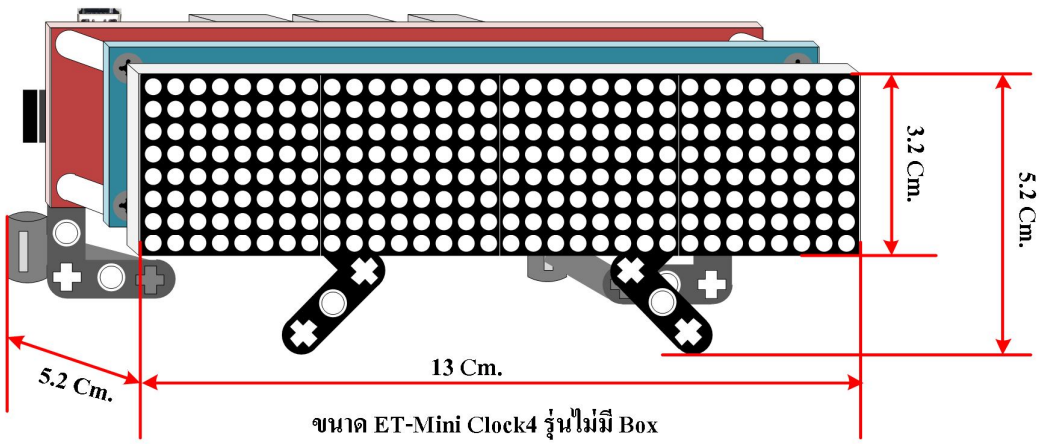


Panel ด้านหลัง

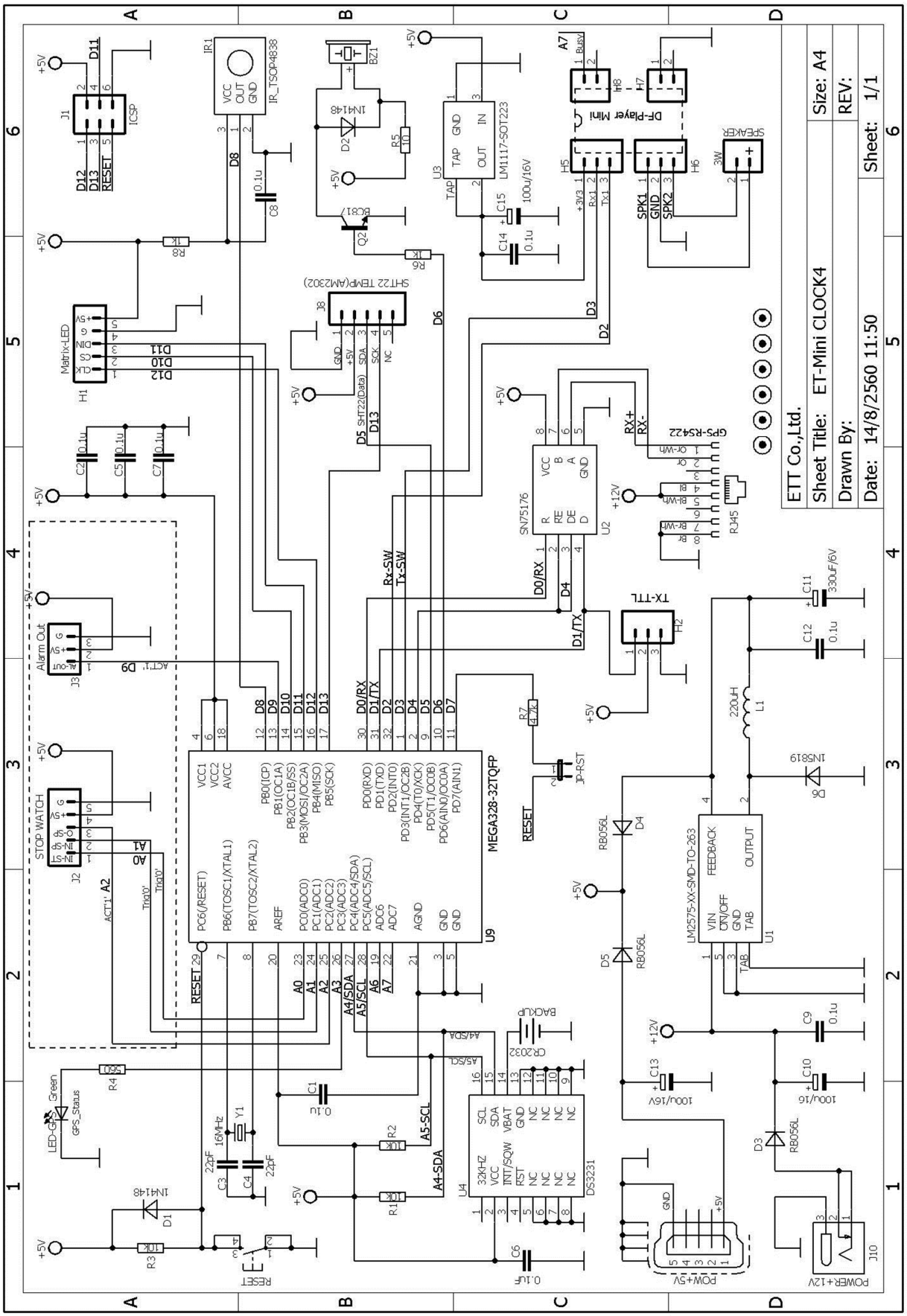




ขนาด ET-Mini Clock4 รุ่นใส่ Box



ขนาด ET-Mini Clock4 รุ่นไม่มี Box



Circuit of Board ET-Mini Clock4 (Control Board)