SEIKO

YEARLY PROGRAMMABLE TIMER

QT-7800 SERIES

OPERATING MANUAL

Thank you for purchasing SEIKO Yearly Programmable Timer QT-7800 Series.

Before using your SEIKO Yearly Programmable Timer, please read this manual carefully for its proper use and care.

Please keep this manual handy for ready reference.

SEIKO TIME SYSTEMS INC.

—CAUTION—

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(2) This manual may be subject to change without notice.
(3) This manual has been prepared to give complete information necessary for the operation, use, handling and maintenance of MODEL QT-7800 Series. For the purpose of our constant technical manual improvement program, your questions, advice, suggestions and comments on the descriptions, illustrations, procedures or any matter concerning this manual are highly appreciated.
(4) SEIKO shall have no liability to the user in respect of any loss or damages, whether consequential or incidental, sustained by the user if such loss or damages are:
    1) due to abuse, misuse, failure to observe instructions given in the manual furnished by SEIKO and neglect of other reasonable care and servicing due to be done by the user irrespective of such instructions, and failure due to deliberate actions or gross negligence or accident;
    2) caused by changes, modifications, or alterations made without prior written consent of SEIKO or by any person other than authorized by SEIKO; or,
    3) due to negligence on the part of the user of what should be done or should not be done as a good caretaker of Yearly Programmable Timer Model QT-7800 Series.

—SAFETY ALERT SYMBOLS—

The symbols and terms used in this manual have the meaning as explained below:

⚠ **DANGER**	DANGER is used to indicate the presence of an imminent hazard which is likely to cause severe personal injury, death, or substantial property damage if the instructions under this heading are ignored.

⚠ **WARNING**	WARNING is used to indicate such operational procedures, practices, or situations that may result in severe personal injury or loss of life if relevant instructions are not followed correctly.

The following pictorial symbols indicate what must NOT be done.

General prohibitions

Prohibition against disassembly/ tampering

Prohibition against exposure to water

Prohibition against touch

The following pictorial symbols indicate what must be done.

General instructions

Connection of grounding conductor

Table of Contents

1. SAFETY PRECAUTIONS

The following precautions must be strictly observed for the safety of yourself and your fellow workers and for the protection of property from loss and damages.

●Safety instructions to the customer

⚠ DANGER	
Prohibition against unauthorized installation and electrical engineering work	Never attempt any of installation work, electrical engineering, and any of the jobs instructed to the engineering outfit ("Installation Instructions"). All of these jobs must always be commissioned to your engineering outfit because they involve electric shock hazards, fire hazards and falling hazards.

⚠ WARNING	
Selection of installation location	The Yearly Programmable Timer is designed for indoor use, and must not be installed outdoors. Otherwise, rainwater may infiltrate into the product to cause electric shock or fire accident.
	It must not be installed in the bathroom or washing area or other damp places, either. This may cause fire or electric shock hazard.
Actions to be taken in case of troubles	If the Yearly Programmable Timer is giving out smoke or burnt smell, or showing other abnormal symptoms, turn off the power switch and cut the power supply immediately. Then, call your nearby SEIKO dealer or agent for repair service. If the Yearly Programmable Timer is used again without being reconditioned, an electric shock or fire may result.
Prohibition against unauthorized disassembly, repair or modification	For repair service, contact your nearby SEIKO dealer or agent. Unauthorized disassembly, repair or modification may cause electric shock accidents or fire accidents.
Operating precautions	When setting the time of each monitor, do not touch any control unit other than specified. Otherwise, an electric shock may result.
Prohibition against wetting with liquids (water, chemicals)	Never immerse the Yearly Programmable Timer into water or any other liquid, or never expose it to splashes of water or any other liquid. Should any water or liquid enter into it, turn off the power switch and cut the power supply immediately. Then call your SEIKO dealer or agent for inspection and servicing. If the Yearly Programmable Timer is used again without being reconditioned, an electric shock or fire may result.
Prohibition against handling with wet hands	Never operate the Yearly Programmable Timer or POWER switch with wet hands. Otherwise, an electric shock may result.
Handling of power cord	When plugging and unplugging the power cord, do not pull the cord, but hold the plug. Otherwise, it may be damaged to cause fire or electric shock hazard. (For models with a power plug)
	Handle the power cord with care not to damage it. Never load it with a heavy object. Never bend over it unduly. All these could lead to an electric shock or fire accident.
	Never use the damaged power cord or plug, or loose socket. This may cause fire or electric shock hazard.

⚠ WARNING

Power supply	Be sure to use only AC 110 V 50/60 Hz with QT68X01, and only AC 220 V 50/60 Hz with QT68X02. If any other power supply than specified is used, electric shock or fire accident may result.
Confirmation of grounding	Check to see if a grounding conductor is terminated to the Yearly Programmable Timer. If it is not grounded, electric shock accident may result when it gets faulty or leaky. The grounding work is required to be of Class D or higher rating, and shall be undertaken by a licensed electrician.
Prohibition against unauthorized fuse replacement	For fuse replacement service, contact your SEIKO dealer or agent. Do not attempt the fuse replacement by yourself unless you are qualified for the job. Otherwise, an electric shock accident may result.
Replacement and collection of Ni-Cd battery	For replacement and collection of the built-in Ni-Cd battery, contact your SEIKO Dealer or agent. Do not attempt the battery replacement by yourself. Otherwise, an electric shock accident may result.
Precautions on the servicing of casing	Before cleaning the surface of the casing, be sure to cut the power supply. An electric shock accident may result.
Prohibition against unauthorized servicing of the internal components	For the servicing of internal components, contact your SEIKO dealer or agent. Do not attempt to do the servicing yourself unless you are qualified for the job. Otherwise, an electric shock accident may result.

●**Instructions to the engineering outfit**

For the engineering outfit

⚠ WARNING

Precautions on installation work

Selection of installation location	The Yearly Programmable Timer is designed for indoor use, and must not be installed outdoors. Otherwise, rainwater may infiltrate into the product to cause electric shock or fire accident.	
	It must not be installed in the bathroom or washing area or other damp places, either. This may cause fire or electric shock hazard.	
Load-bearing capacity	Make sure that the wall or other structure onto which the product is to be mounted has a sufficient strength to bear up against the load of the product. If the wall strength is not sufficient, it may yield to the product weight or external shocks, letting fall the product to cause fatal accidents.	
Mounting onto the concrete wall	When mounting on to the concrete wall, use AY plugs and bolts. Never use wood screws to fasten the product. Wood screws may yield under wind pressure and vibrations, and let fall the product to cause fatal accidents.	
Tightening of screws	Be sure to tighten each bolt into the anchor plug fully. Otherwise, the product may come off from the wall as the bolts may loosen off under the influence of wind pressure or vibrations, causing fatal accidents.	
Fixing of stay	When opening the front panel, fix the stay securely to keep the panel open. Otherwise, the front panel will be closed by touching it accidentally, causing a malfunction of the product as well as fatal accidents.	
Electrical engineering work	Before wiring the input/output terminal blocks, make sure that AC power is not supplied, and that the battery is not connected. You are warned against working on live circuits as they involve fatal electric shock hazards.	
Grounding work	Ground the Yearly Programmable Timer by connecting a grounding conductor to its grounding terminal. This is important for the prevention of electric shock hazards in case of troubles such as earth leakage fault. The grounding work must be Class D or higher in rating.	
Installation of terminal board cover	After wiring the input/output terminal blocks, be sure to replace the terminal board cover for the protection of operators against electric shock.	
Power supply	Be sure to use only AC 110 V 50/60 Hz with QT-78X01, and only AC 220 V 50/60 Hz with QT-78X02. If any other power supply than specified is used, an electric shock or a fire will be caused.	
Connection of battery	Connect the battery after all the installation and electrical works are completed. Before connecting the battery, make sure that the power is not supplied to the product. Otherwise, an electric shock may result.	
Replacement of battery	Be sure to use only the specified battery with the Yearly Programmable Timer.	
Replacement of fuse	When the fuse was melted and needs to be replaced, first, locate and remove the cause, check that the power switch is turned off, and then, replace it with a specified fuse. Otherwise, an electric shock or a fire will be caused.	

2. OVERVIEW

SEIKO QT-7800 Series is a high-precision quartz master clock equipped with a yearly programmable timer function. It is so high-quality as well as high-capacity as to allow up to 1,000 steps of programs to be set and have 8 channels of contact signal outputs to control various devices. The programs can be set easily using computer application software, and they can be imported into the Yearly Programmable Timer by using USB memory. RS-422 synchronous output and daylight saving time function are also provided.
A dedicated GNSS receiver (GNS-300) can be connected to the Yearly Programmable Timer to correct the inner clock automatically on a regular basis. In adition,QT-7800 Series is equipped with a time server function as standard that can bring the time of secondary clocks,computers and other devices on the network in sync with the time of QT-7800 Series.

3. FEATURES

The Yearly Programmable Timer has 8 channels of contact signal outputs. They can be programmed to control ON/OFF of various devices connected to the Yearly Programmable Timer. In addition to the yearly programmable timer function, QT-7800 Series is equipped with the following functions:

(1) Master clock function (QT-7810X, QT-7820X and QT-7830X)
Up to 30 secondary clocks can be connected to each secondary clock circuit (if the current consumption of each secondary clock is 12 mA).

(2) External synchronization function
By connecting a 30-sec. polarized signal with the external synchronization input, the loss/gain of the clock is corrected automatically. Besides, by inputting a serial time signal (RS-422), the clock is kept in constant sync with the input time.

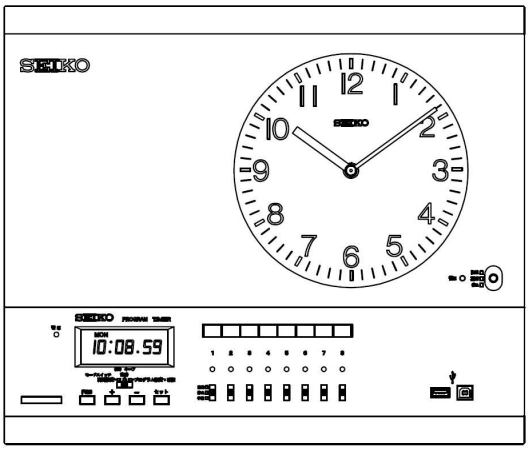
(3) Time server function
It can bring the time of secondary clocks,computers and other devices on the network in sync with the QT-7800 Series.

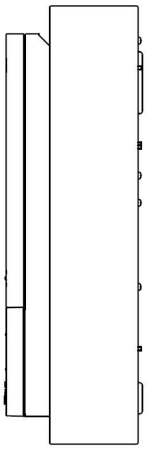
(4) Time correction with GNSS (when connected with an optional GNSS receiver GNS-300)
By connecting a GNSS receiver (GNS-300), the time is automatically corrected on a regular basis.

4. ACCESSORIES AND SPARES

Accessories and Spares	Quantity	Remarks
Plastic foot	4 pieces	
USB memory	1 piece	Attached with application software
Miniature fuse	3 pieces	QT-7810X~QT-7820X: 250V, 2 A QT-7830X: 250V, 3 A
Insulated crimp terminal	See “Remarks” column.	QT-78101 M4: 26 pcs., M3: 6 pcs. QT-78102 M4: 26 pcs., M3: 6 pcs. QT-78201 M4: 28 pcs., M3: 6 pcs. QT-78202 M4: 28 pcs., M3: 6 pcs. QT-78301 M4: 30 pcs., M3: 6 pcs. QT-78302 M4: 30 pcs., M3: 6 pcs.
Instruction manual	2 copies	
Mounting hole drilling template	1 sheet	

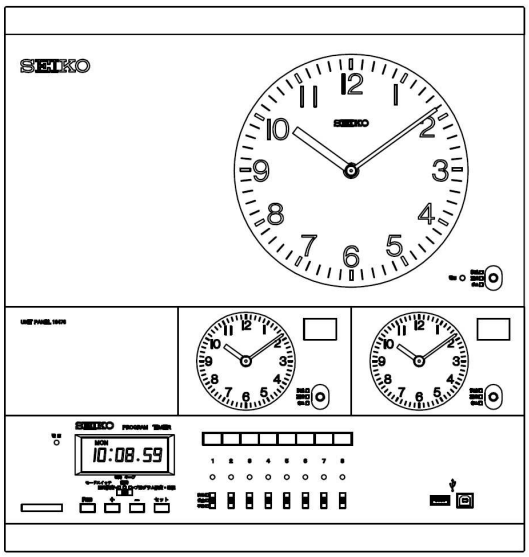
5. LIST OF PRODUCTS

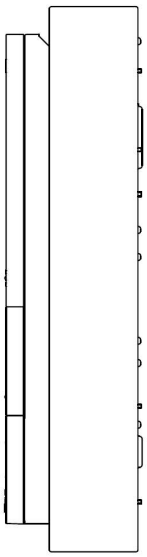




Models with 1 secondary clock circuit

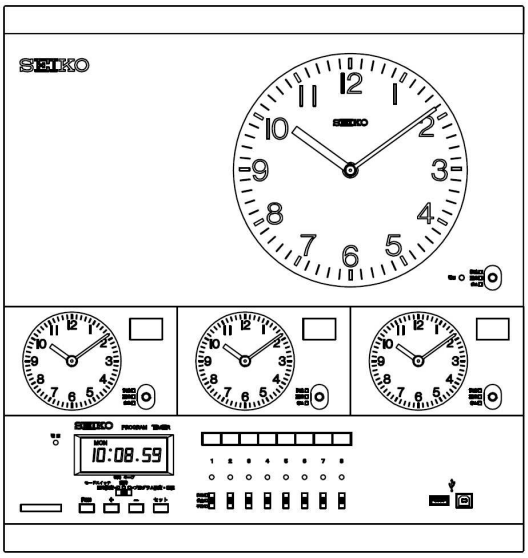
QT-78101	Drives up to 30 secondary clocks
QT-78102	Drives up to 30 secondary clocks

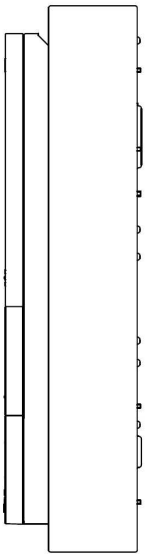




Models with 2 secondary clock circuits

QT-78201	Drives up to 60 secondary clocks
QT-78202	Drives up to 60 secondary clocks

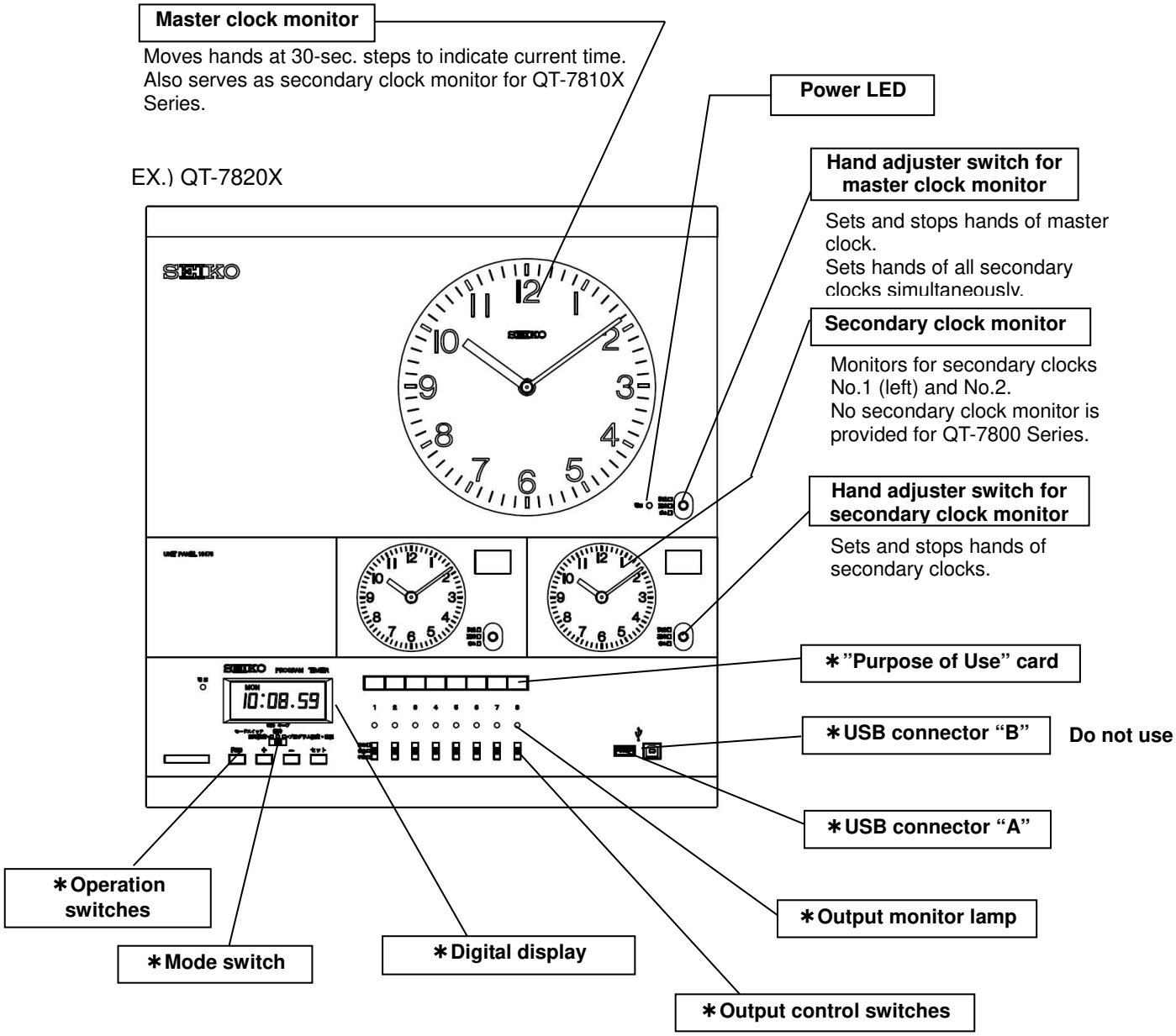




Models with 3 secondary clock circuits

QT-78301	Drives up to 90 secondary clocks
QT-78302	Drives up to 90 secondary clocks

6. NOMENCLATURE AND FUNCTIONS (FRONT PANEL)



∗For details of the parts on the control panel,
see "**8. NOMENCLATURE AND FUNCTIONS (PROGRAMMABLE TIMER)**" on page 8.

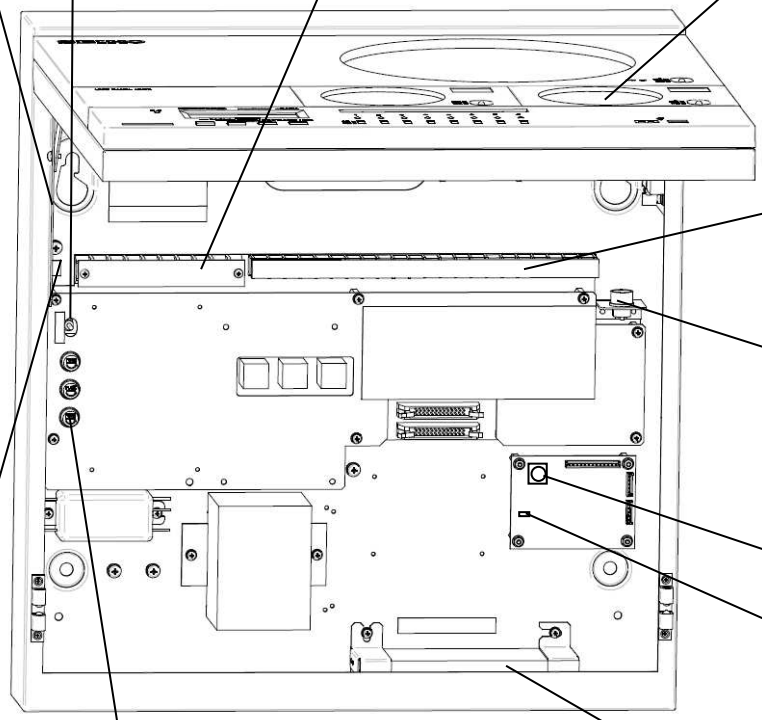
7. NOMENCLATURE AND FUNCTIONS (INSIDE PARTS)

Stay
Keeps front panel open during installation and wiring works.

Power switch
Turns ON/OFF AC power supply.

Input/output terminal block

EX.) QT-7820X



Secondary clock monitor
Adjusts hands of secondary clocks by turning a wheel on rear side.

Input/output terminal block

Connector for GNSS receiver

Reset switch

Malfunction lamp
Lights up when output line of secondary clock is short-circuited. Goes out by pressing reset switch.

Battery

Grounding terminal
Be sure to connect a grounding conductor to grounding terminal.

Power fuse
From top to bottom
F1, F2：2A for AC power supply
F3：2A for battery
In the case of QT-7820X

8. NOMENCLATURE AND FUNCTIONS (PROGRAMMABLE TIMER)

"Purpose of Use" card

Purpose of use of each channel can be printed on it.
It can be removed by sliding it sideways while pressing it.

USB connector "B"

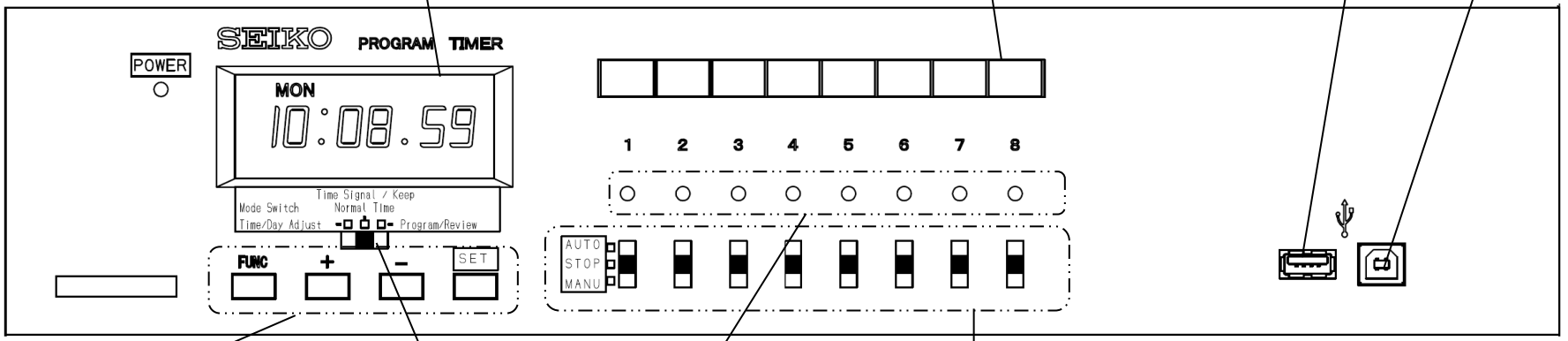
Do not use.

Digital display

Displays day-of-week and time while in Normal Time mode.
Displays different items while in Program /Review mode.

USB connector "A"

For inserting USB memory to input/output programs.



Operation switches

Operation and functions of the switches differ depending on mode switch setting.
Time/Day Adjust mode: Setting of time, calendar and radio frequency.
Normal Time mode: Changeover between time and calendar displays.
Program/Review mode: Review of programs already registered, and input/output of programs.

Output monitor lamp

Lights up while signal of each channel is output.

Mode switch

While in normal use, set the switch at the Normal Time position.
Time/Day Adjust mode
Normal Time mode
Program/Review mode

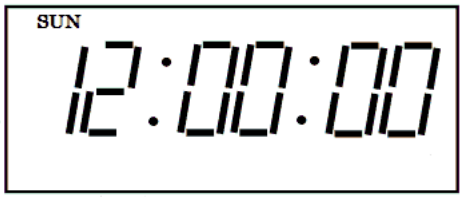
Output control switches

They control signal output of each channel (the leftmost switch corresponds to CH1, the next to CH2, and so on).
AUTO: Output is made according to program setting.
STOP: Output is turned off irrespective of program setting.
MANU: Output is made as desired irrespective of program setting.

9. TIME/CALENDAR SETTING

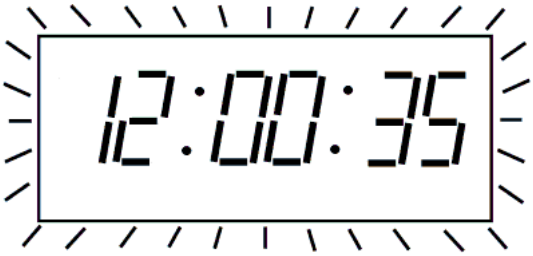
9.1 Powering-Up

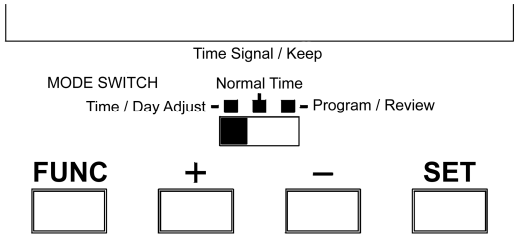
Open the front panel to turn ON the power switch.
Once the power switch is turned OFF, wait at least for 10 seconds to turn ON the power again.
As the power switch is turned ON, following display appears on the digital display.



9.2 Time Setting

Set the mode switch to Time/Day Adjust.
The Time/Day Adjust mode is activated, and the time display starts flashing.





(1) Hour setting

Press SET to show the hour setting display. The hour digits start flashing, and the second digits are reset to “00”.

Press + or − to set the hour.

Keeping + or − pressed will quickly advance or decrease the digits, respectively.

(2) Minute setting

Press SET to show the flashing minute digits.

Press + or − to set the minutes.

(3) Second setting (resetting to “00”)

Press SET in accordance with a time signal.

The clock starts operating, and the digits stop flashing.

To terminate the setting procedure before the adjustment is completed, set the mode switch to Normal Time.

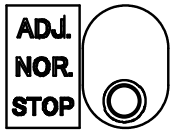
9.3 Time Setting for Clock Monitors

(1) Set the hand adjuster switches for all the clock monitors to STOP.

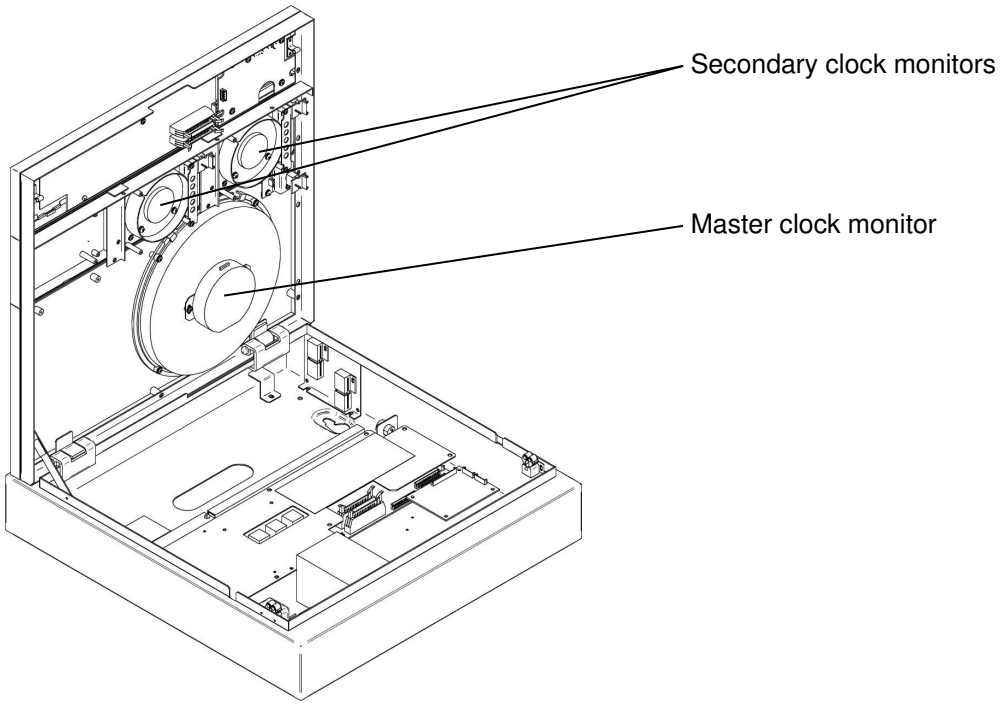
(2) Set the times of all the clock monitors and secondary clocks to an identical time.

To set the time of the master clock monitor, open the movement cover, and turn the wheel with fingers.

To set the time of the secondary clock, turn the wheel on its rear.



EX.) QT-7820X



⚠ WARNING

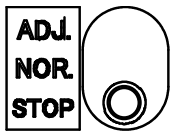
When setting the time of each monitor, do not touch any control unit other than specified. Otherwise, an electric shock may result.

(3) Set the time of monitors and secondary clocks to that of digital display

Set the hand adjuster switches for all the clock monitors to NOR.

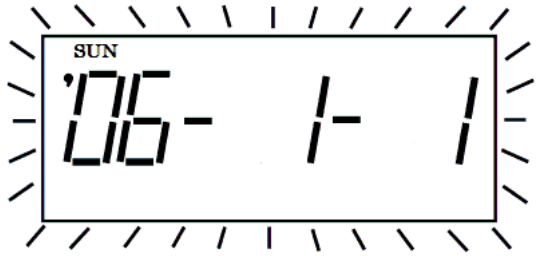
Set the hand adjuster switch of the master clock monitor to ADJ. Hands of all the clock monitors start moving quickly.

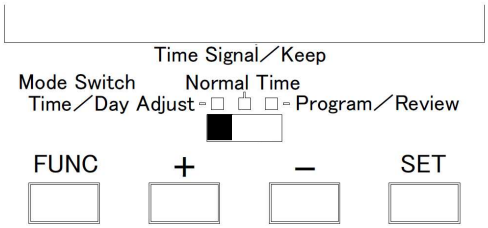
When the hands indicate the time shown on the digital display, set the hand adjuster switch of the master clock monitor to NOR.



9.4 Calendar Setting

Set the mode switch to Time/Day Adjust.
Press [FUNC] to show the flashing calendar display.
“Year” is represented by the last two digits.





(1) Year setting

Press [SET] to show the flashing year digits.
Press [+] or [−] to set the year.
The year digits can be set from “00” to “99”, and after “99”, it returns to “99”.

Keeping [+] or [−] pressed will quickly advance or decrease the digits, respectively.

(2) Month setting

Press [SET] to show the flashing month digits.
Press [+] or [−] to set the month.
The month is indicated by the number from “1” to “12”, with “1” meaning January, “2” February, and so on. After “12”, the displayed number returns to “1”.

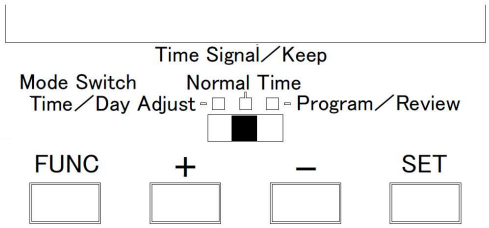
(3) Date setting

Press [SET] to show the flashing date digits.
Press [+] or [−] to set the date.
The date digits changes from “1” to the end date of the month.
The day of the week is set automatically, and does not need to be set.
Pressing [SET] registers the calendar you have set, and returns the display to the flashing calendar.
To terminate the setting procedure before the adjustment is completed, set the mode switch to Normal Time.

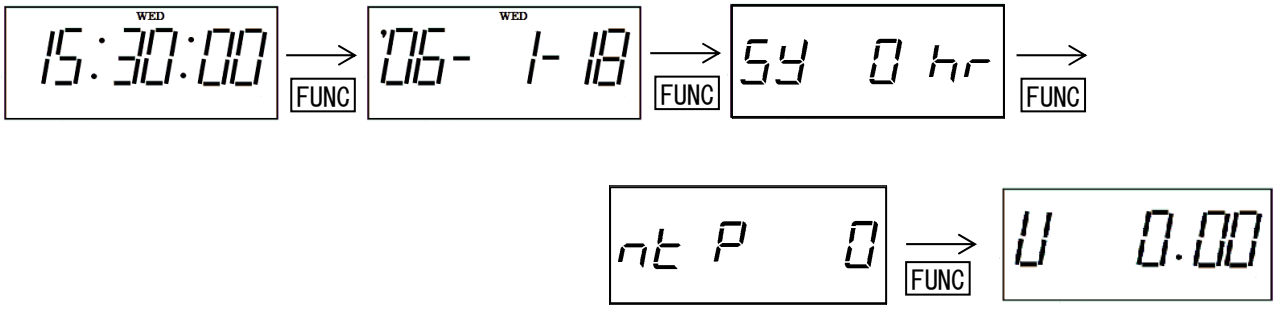
After all the time/calendar adjustment is completed, set the mode switch to Normal Time.

10. NORMAL TIME MODE

While in normal use, set the mode switch to Normal Time



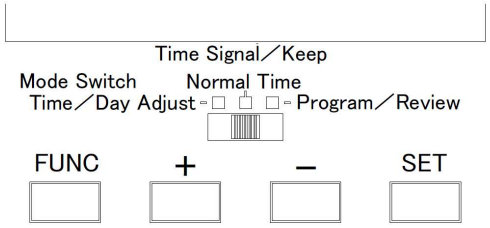
With each press of FUNC in the Normal Time mode, the time, calendar, time elapsed from the previous correction, operation condition of the NTP server, version No. of the firmware are shown in order.



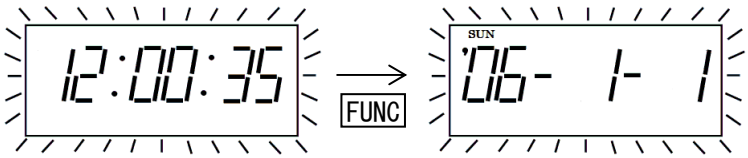
“The time elapsed from the previous correction” refers to the time elapsed after the last time correction was made by means of GNSS receiver (option), or external synchronization.
If more than 99 hours have passed without any time correction after the power was turned on, time/calendar was set, or the previous time correction was made, “- -“ is displayed for the “time elapsed from the previous correction.”
The operation condition of the NTP server is checked in 10-second intervals. It is normal if “0” is displayed.

11. TIME/DAY ADJUST MODE

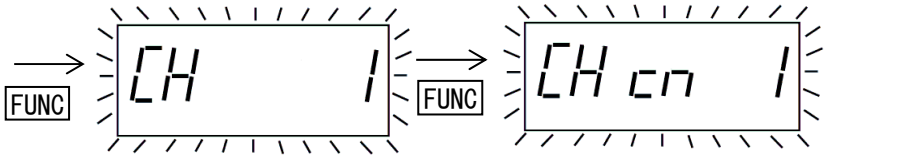
Set the mode switch to “Time/Day Adjust” to set the time and calendar.



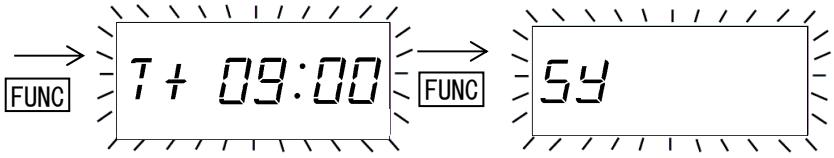
Following functions are provided for the Time/Day Adjust mode. Press FUNC to show each function in the order shown below, and press SET to activate the selected function.



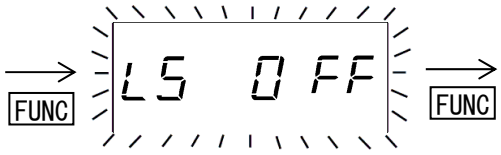
Time setting　　Calendar setting



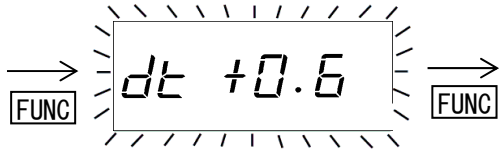
Electronic chime checking　　Number of repetitions of electronic chime



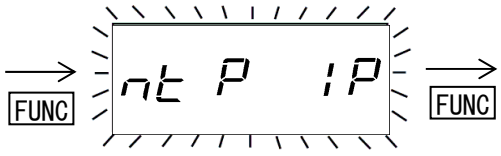
Time difference setting　　Time correction setting



Leap second setting



Terrestrial digital offset setting



NTP submenu setting

With each press of + or −, the time correction setting display changes in the following or reverse order, respectively:

External synchronization input (30-sec. polarized signal)	: “Sy”
Radio frequency setting	: “ra”
Standard radio wave (Low frequency wave) time correction	: “LF”
GNSS time correction	: “gP”
External synchronization input (RS422)	: “JL”
External synchronization input (RS422)	: “JU”
Terrestrial digital time correction	: “dt”

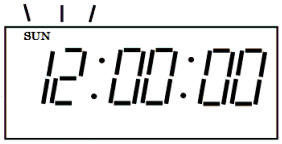
※This Quarts Master does not support time correction function by means of FM radio wave,standard radio wave and Terrestrial digital radio wave.
Though such indications are displayed, the clock is not equipped with the corresponding functions.

※When the Quarts Master Clock is used in external synchronization function (RS-422),
External synchronization function (RS-422) JL is normally used

After the Time/Day Adjust mode setting is completed, be sure to set the mode switch to “Normal Time.”

11.1 Time Setting

Press [FUNC] to show the flashing time display, and press [SET] to activate the time setting function. The hour digits start flashing, and the second digits are reset to “00”.



(1) Hour setting

Press [+] or [−] to set the hour.

Keeping [+] or [−] pressed will quickly advance or decrease the digits, respectively.

(2) Minute setting

Press [SET] to show the flashing minute digits.

Press [+] or [−] to set the minutes.

(3) Second setting (resetting to “00”)

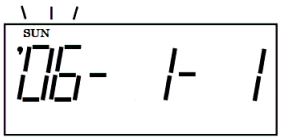
Press [SET] in accordance with a time signal.

The clock starts operating, and the digits stop flashing.

To terminate the setting procedure before the adjustment is completed, press [FUNC] or set the mode switch to the Normal Time.

11.2 Calendar Setting

Press [FUNC] to show the flashing calendar display, and press [SET] to activate the calendar setting function. The year digits start flashing.



(1) Year setting

Keeping [+] or [−] pressed will quickly advance or decrease the digits, respectively.

Press [+] or [−] to set the year.

The year digits can be set from “00” to “99”, and after “99”, it returns to “99”.

(2) Month setting

Press [SET] to show the flashing month digits.

Press [+] or [−] to set the month.

The month is indicated by the number from “1” to “12”, with “1” meaning January, “2” February, and so on. After “12”, the displayed number returns to “1”.

(3) Date setting

Press [SET] to show the flashing date digits.

Press [+] or [−] to set the date.

The date digits changes from “1” to the end date of the month.

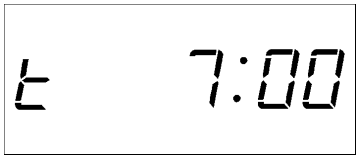
The day of the week is set automatically, and does not need to be set.

Pressing [SET] registers the calendar you have set, and returns the display to the flashing calendar.

To terminate the setting procedure before the adjustment is completed, press [FUNC] or set the mode switch to Normal Time.

11.3 Time Difference Setting

UTC (Coordinated Universal Time) is the international standard time that corresponds to the time of the United Kingdom when the daylight saving time is not in effect.
Set the time difference of the country or city where the Yearly Programmable Timer is used.
The time difference can be set within the range from “-12:00” to “+12:00” at 1-hour intervals.



- **Time difference setting**

MODE — Pressing the button while in the Time/Day Adjust mode will return the display to the Normal Time mode. All the digits you have set will be cancelled, and the time difference previously set will remain.

＋ — With each press of the button, the time difference is increased by 30 minutes. The digits are advanced quickly by keeping it pressed.

－ — With each press of the button, the time difference is decreased by 30 minutes. The digits are moved back quickly by keeping it pressed.

SET — Pressing the button while in the Normal Time mode will activate the time difference setting function. While setting the time difference, press it to register the time difference you have set. The clock will return to the Normal Time mode.

[For reference] List of Time Differences (when DST is not in effect)

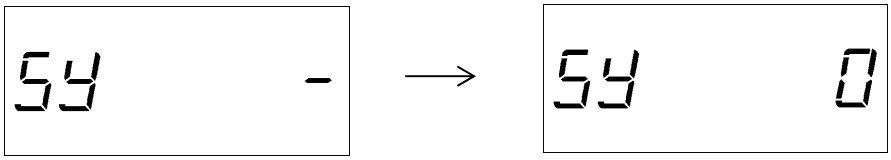
City	Country	Time difference
Sydney	Commonwealth of Australia	+10:00
Tokyo	Japan	+09:00
Beijin, Hong Kong Manila Singapore	People's Republic of China Republic of the Philippines Republic of Singapore	+08:00
Bangkok Jakarta	Kingdom of Thailand Republic of Indonesia	+07:00
New Delhi	Republic of India	+05:30
Abu Dhabi, Dubai Moscow	United Arab Emirates Russian Federation	+04:00
Manama Kuwait Riyadh	Kingdom of Bahrain State of Kuwait Kingdom of Saudi Arabia	+03:00
Cairo Johannesburg Helsinki	Arab Republic of Egypt Republic of South Africa Republic of Finland	+02:00
Berlin Madrid Oslo Paris Rome Stockholm	Federal Republic of Germany Kingdom of Spain Kingdom of Norway French Republic Italian Republic Kingdom of Sweden	+01:00
London	United Kingdom	00:00
Rio de Janeiro	Federative Republic of Brazil	-03:00
Montreal New York	Canada United States of America	-05:00
Los Angeles, San Francisco	United States of America	-08:00
Honolulu	United States of America	-10:00

11. 4 Time Correction Setting

11. 4. 1 External Synchronization Input (30-Sec. Polarized Signal)

Press FUNC to show the time correction setting display. Then, press ＋ or － to show the following display, and press SET.

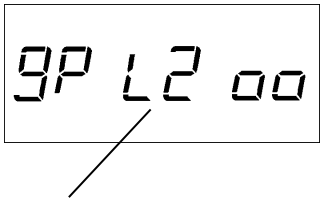
When a 30-sec. polarized signal is connected to the external input terminal, “0” is displayed.
“0” returns to “-“ in 3 seconds.



11. 4. 2 Time Correction with GNSS

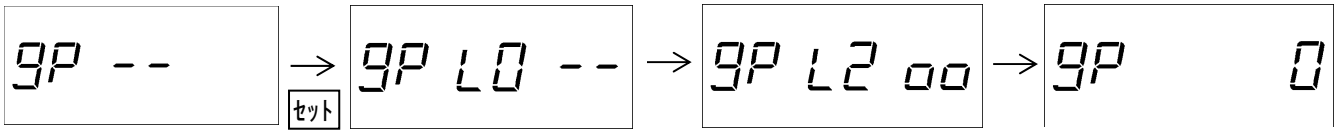
By connecting the optional GNSS receiver (GNS-300), the time correction is made automatically on a regular basis.
Press SET while the GNSS display is shown to start GNSS reception from the receiver.

(1) Display of reception level of the GNSS receiver



Reception level of GNSS receiver: displayed in 6 levels from L0 to L5

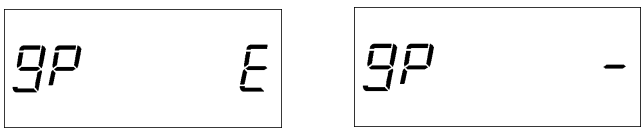
(2) When GNSS reception is started by pressing SET :



GNS-300 is searching GNSS satellite:
Two “-“ marks appear alternately.

GNSS signal is received:
Two “o“ marks appear alternately.

Time correction is completed:
Return the mode to Normal Time.

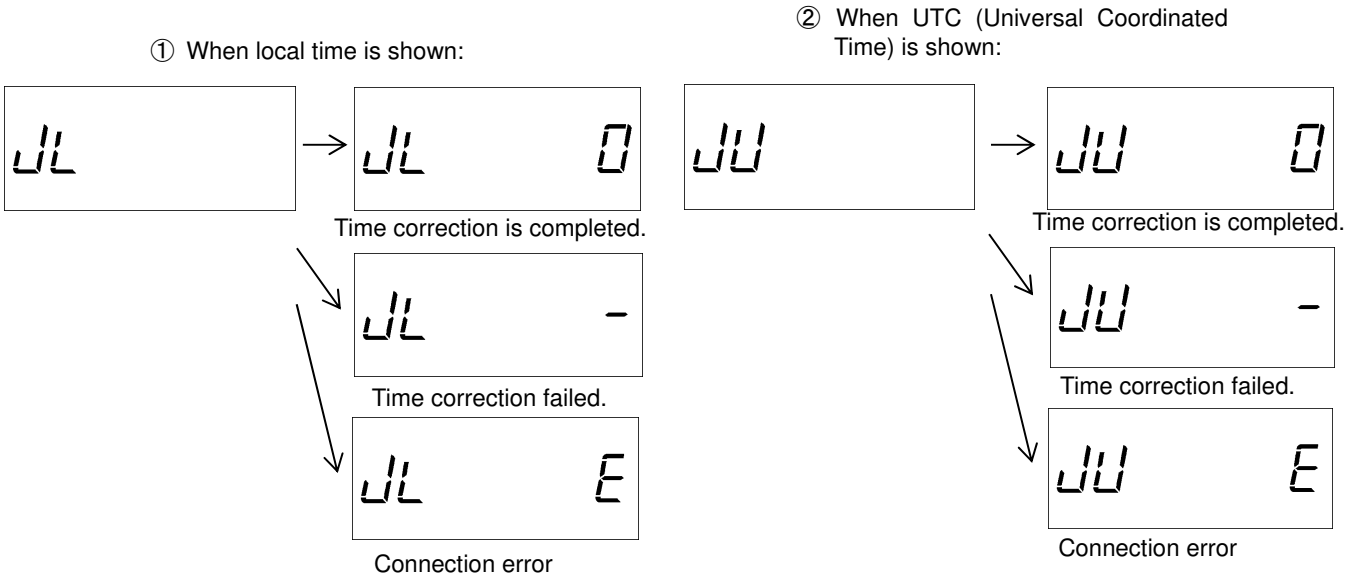


Connection error of GNS-300:
“E” flashes.

Time correction with GNSS failed:
“-“ mark flashes.

11. 4. 3 External Synchronization Input (RS-422)

When time correction is started by pressing SET (the clock is kept in constant sync with the input time while this time correction method is selected):

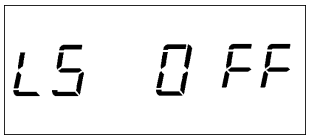


11. 5 Leap Second Adjustment

Turning off of leap second adjustment:

The leap second adjustment will not be made.

Even in that case, if the time correction with FM or standard radio wave or GPS is performed on a regular basis, or if the synchronization input from external devices such as another master clock is connected, the Yearly Programmable Timer keeps good time after they have undergone the leap second adjustment.

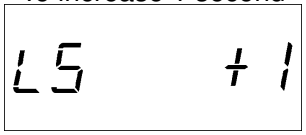


Leap second adjustment is turned off

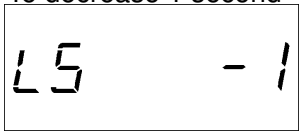
Leap second adjustment setting:

The leap second adjustment setting can be made manually.

To increase 1 second



To decrease 1 second



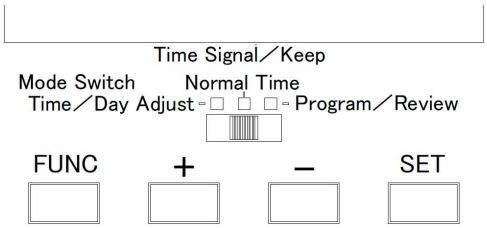
Press [+] or [−] to select “+1” or “-1,” and press SET.

Be sure to make this setting within 6 months before the date when the leap second is in effect.

The leap second adjustment will be made immediately before 9 o’clock (10 o’clock when the daylight saving time is in effect) on the 1st day of the next month.

After the adjustment has been made, the setting for the leap second adjustment will be turned off automatically.

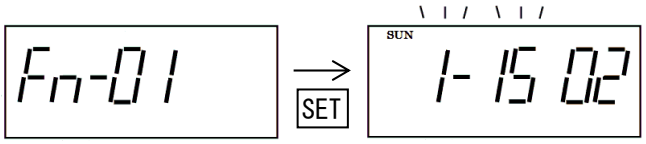
12. PROGRAM/REVIEW MODE



Set the mode switch to Program/Review.
The Program mode has four functions from “Fn-01” to Fn-04”, and the Review mode has two functions of “Fn-12” and Fn-14”.
Press [FUN C] to show each function, and press [SET] to activate the selected function.
The programs set and checked here should be created using the computer software. For details, refer to the instruction manual for the “Program Setting Software” (separate volume).
After the Program/Review mode is used, be sure to set the mode switch to Normal Time

12.1 Review of Daily Program (Fn-01)

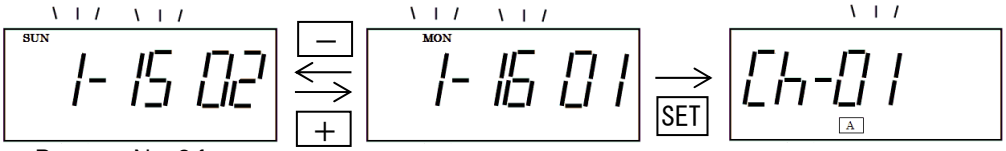
Press [FUNC] to show “Fn-01” display, and press [SET].
The flashing current month and date, and the program No. designated in the yearly program are shown.



Program No. 2 for January 15

(1) Selection of date

Press [+] or [−] to select the desired date, and press [SET].
Channel No. 1 is displayed with “01” flashing.

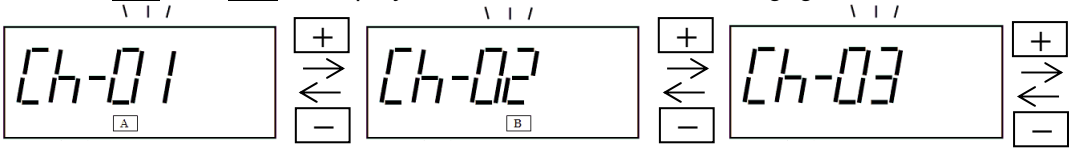


Program No. 2 for January 15

Program No. 1 for January 16

(2) Selection of channel

Press [+] or [−] to show the channel on by one.
[A] is displayed when the channel is engaged for Time Signal, and [B] is displayed when it is engaged for “Keep” (engagement for a long duration of time).
Neither [A] nor [B] is displayed when the channel is disengaged.



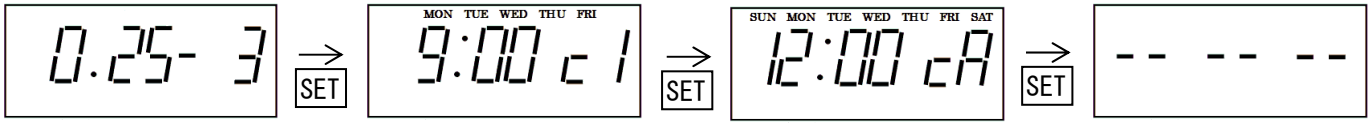
Channel No.1 is engaged for Time Signal.

Channel No.2 is engaged for “Keep”.

Channel No.3 is disengaged.

(3)-1 Review of Program (when the channel is engaged for Time Signal)

Press [+] or [−] to select the desired channel, and press [SET].
If the channel is engaged for Time Signal, the duration of Time Signal and the rise time of the amplifier are shown.
Pressing [SET] will show the time designated for the Time Signal output and the melody No. of the electronic chime (“A” is displayed for “No. 10”).
With each press of [SET], the program is shown one by one in chronological order. After all the programs are shown, “-- -- --“ will be displayed.
Press [FUNC] to return to the date selection procedure (see “**(1) Selection of date**”).



Time signal duration: 25 seconds
Rise time: 3 seconds

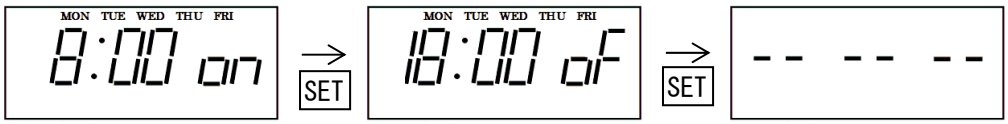
Melody No.1 sounds at 9:00 from Monday to Friday

Melody No.10 sounds at 12:00 from Sunday to Saturday

All the programs have been shown.

(3)-2 Review of Program (when the channel is engaged for “Keep”)

Press [+] or [−] to select the desired channel, and press [SET].
If the channel is engaged for “Keep” (engagement for a long duration of time), the time designated for the signal output and whether the device is set to turn ON or OFF are shown.
With each press of [SET], the program is shown one by one in chronological order. After all the programs are shown, “-- -- --“ will be displayed.
Press [FUNC] to return to the date selection procedure (see “**(1) Selection of date**”).



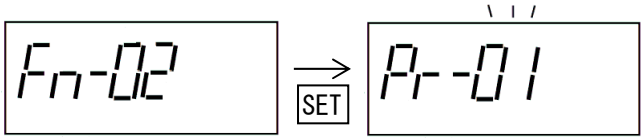
The device is set to turn ON at 8:00 from Monday to Friday.

The device is set to turn OFF at 18:00 from Monday to Friday.

All the programs have been shown.

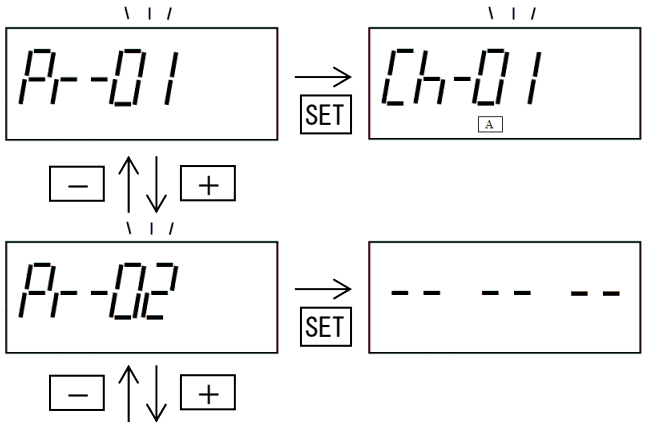
12.2 Review of Weekly Program (Fn-02)

Press [FUNC] to show “Fn-02” display, and press [SET].
Program No. 1 is displayed with “01” flashing.



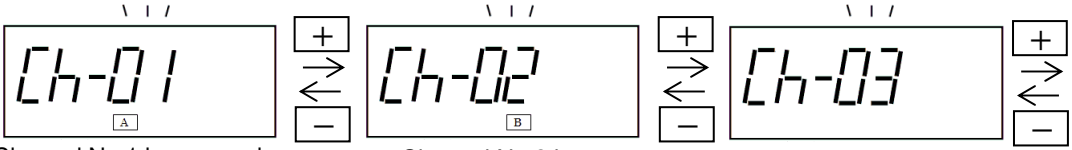
(1) Selection of program No.

Press [+] or [−] to select the desired date, and press [SET].
Channel No. 1 is displayed with “01” flashing.
If the program No. that has not been registered is selected, “-- -- --“ will be shown.



(2) Selection of channel

Press [+] or [−] to show the channel one by one.
[A] is displayed when the channel is engaged for Time Signal, and [B] is displayed when it is engaged for “Keep” (engagement for a long duration of time).
Neither [A] nor [B] is displayed when the channel is disengaged.



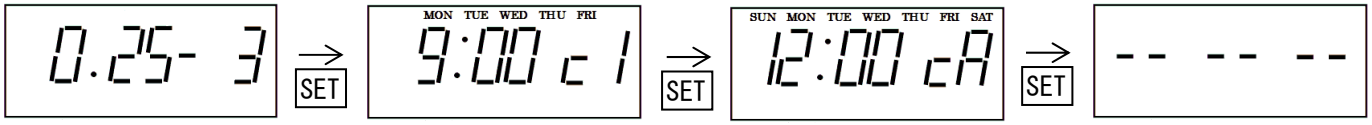
Channel No.1 is engaged for Time Signal.

Channel No.2 is engaged for “Keep”.

Channel No.3 is disengaged.

(3)-1 Review of Program (when the channel is engaged for Time Signal)

Press [+] or [−] to select the desired channel, and press [SET].
If the channel is engaged for Time Signal, the duration of Time Signal and the rise time of the amplifier are shown.
Pressing [SET] will show the time designated for the Time Signal output and the melody No. of the electronic chime (“A” is displayed for “No. 10”).
With each press of [SET], the program is shown one by one in chronological order. After all the programs are shown, “-- -- --“ will be displayed.
Press [FUNC] to return to the date selection procedure (see “**(1) Selection of program No.**”).



Time signal duration:
25 seconds
Rise time: 3 seconds

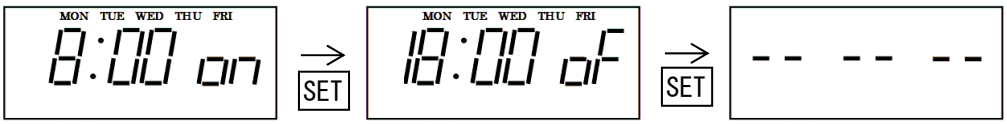
Melody No.1
sounds at 9:00 from
Monday to Friday

Melody No.10
sounds at 12:00 from
Sunday to Saturday

All the programs
have been shown.

(3)-2 Review of Program (when the channel is engaged for “Keep”)

Press [+] or [−] to select the desired channel, and press [SET].
If the channel is engaged for “Keep” (engagement for a long duration of time), the time designated for the signal output and whether the device is set to turn ON or OFF are shown.
With each press of [SET], the program is shown one by one in chronological order. After all the programs are shown, “-- -- --“ will be displayed.
Press [FUNC] to return to the date selection procedure (see “**(1) Selection of program No.**”).



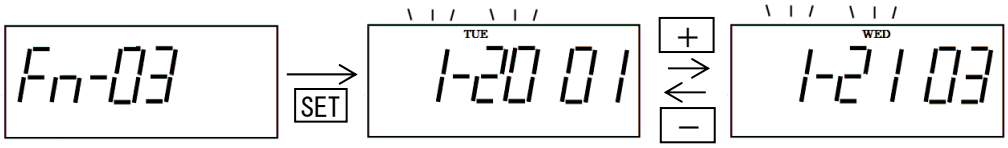
The device is set to
turn ON at 8:00 from
Monday to Friday.

The device is set to
turn OFF at 18:00 from
Monday to Friday.

All the programs
have been shown.

12.3 Review of Yearly Program (Fn-03)

Press [FUNC] to show “Fn-03” display, and press [SET].
The flashing current month and date, and the program No. designated in the yearly program are shown.
Press [+] or [−], and the Program No. for the next date or the previous date is displayed, respectively.



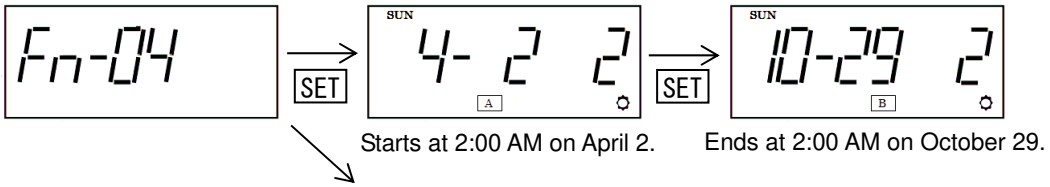
Program No. 1 for January 20

Program No. 3 for January 21

When the programs for the next year are displayed, [Next Year] is shown.
By pressing [SET], the program Nos. set for the Special Period Setting, National Holiday Setting and Special Date Setting are displayed one by one.

12.4 Review of Daylight Saving Time Program (Fn-04)

Press [FUNC] to show “Fn-04” display, and press [SET].
The starting time and date, and the ending time and date of the daylight saving time you have designated are shown in order.
If the daylight saving time has not been set, “-- -- ” will be displayed.



Starts at 2:00 AM on April 2.

Ends at 2:00 AM on October 29.

Daylight saving time has not been set.

12. 5 Importing Program from USB Memory (Fn-12)

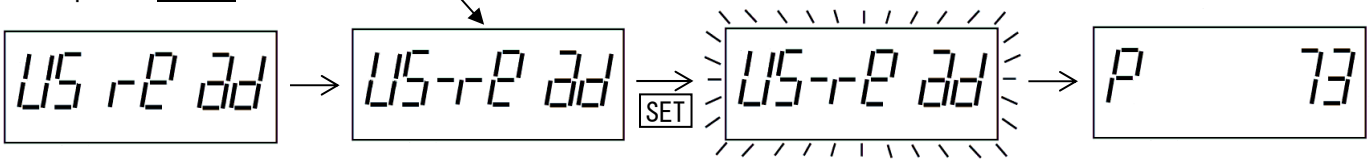
Import the Program Setting File created on the PC to the Yearly Programmable Timer from the accessory USB memory.
Press [FUNC] to show “Fn-12” display, and press [SET].

(1) Inserting USB memory

Insert the USB memory into the USB connector “A.” (If the USB memory is recognized correctly, the light inside it flashes for a few seconds.)
Note that the USB memory should have a Program Setting File written into it by executing ［Write it in USB flash drive］ in ［Connection］ menu in the “QT/TU Series Program Setting Software for Program Timer.”
(For details, refer to the instruction manual for the “Program Setting Software” (separate volume).)

(2) Importing program

After checking that “-“ is shown after “US” and that the light inside the USB memory stops flashing, press [SET].



The display starts flashing, and the program starts to be imported from the USB memory.
When the import of the program is properly completed, a buzzer sounds, and the total number of steps of the imported program is shown.
When an error display is shown, set the mode switch to Normal Time, and then, repeat the importing procedure.

(3) Removing USB memory

Remove the USB memory, and set the mode switch to Normal Time.

12. 6 Exporting Program to USB Memory (Fn-14)

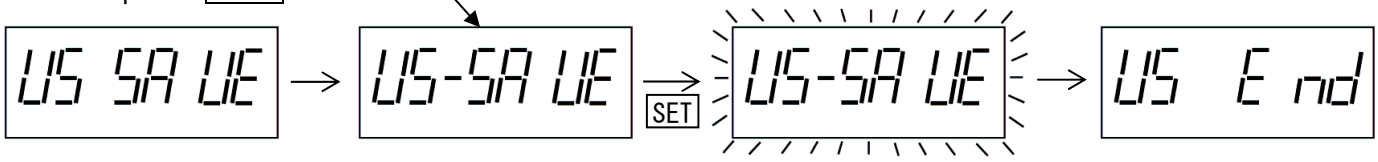
Export the Program Setting File running on the Yearly Programmable Timer to the accessory USB memory.
This procedure is mainly for maintenance purpose, and should be followed only on an as-needed basis.
Press [FUNC] to show “Fn-14” display, and press [SET].

(1) Inserting USB memory

Insert the USB memory into the USB connector “A.”

(2) Exporting program

After checking that “-“ is shown after “US” and that the light inside the USB memory stops flashing, press [SET].



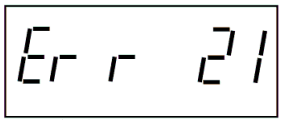
The display starts flashing, and the program starts to be exported to the USB memory.
When the export of the program is properly completed, a buzzer sounds, and “End” is shown.
The program exported to the USB memory can be checked on the PC by executing ［Read from USB flash drive］ in ［Connection］ menu in the “QT/TU Series Program Setting Software for Program Timer.”
(For details, refer to the instruction manual for the “Program Setting Software” (separate volume).)
When an error display is shown, set the mode switch to Normal Time, and then, repeat the exporting procedure.

(3) Removing USB memory

Remove the USB memory, and set the mode switch to Normal Time.

12. 7 Errors in Setting Programs

For the errors that occur during import and export of the program, refer to the table below.



Display of Error No. 21

Error No.	Error descriptions		Remedies
21	Open errors	USB memory is not inserted into connector of Yearly Programmable Timer. Program has not been imported into USB memory from PC. There is not enough free space in USB memory.	Insert USB memory included with Yearly Programmable Timer into connector. Execute [Write it in USB flash drive] on PC again. Use USB memory having enough free space.
22	Import errors	Imported program setting data is faulty.	Program setting data stored in USB memory was faulty. Execute [Write it in USB flash drive] on PC again.
99	Other errors	Import/export procedure cannot be executed properly.	Repeat procedure again. Another error may indicate that Yearly Programmable Timer is out of order.

13. NETWORK CONNECTION

QT-7800 Series is equipped with a time server function that can bring the time of secondary clocks, computers, and other devices on the network into sync with the time of QT-7800 Series.

Specifications of time server function

LAN interface	: 10 BASE-T, 100 BASE-T
Protocol	: SNTPv3, SNTPv4

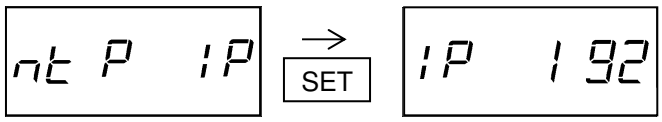
Factory default settings of time server

IP address	: 192.168.0.1
Subnet mask	: 255.255.255.0
Gateway address	: None
Password	: None

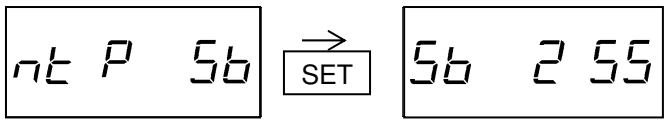
13. 1 Checking of Network Settings

Press [FUNC] to show the NTP sub menu display. Then, press [+] or [—] to show the following displays, and press [SET].

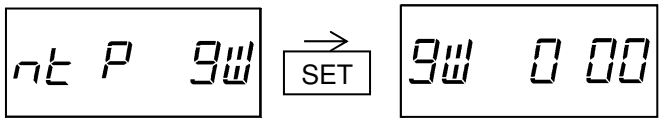
To check IP address, press [SET] repeatedly four times when the display below is shown.



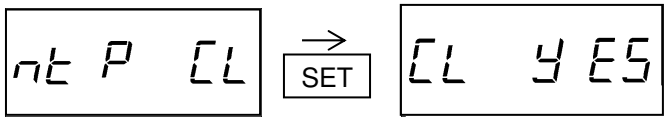
To check subnet mask, press [SET] repeatedly four times when the display below is shown.



To check gateway address, press [SET] repeatedly four times when the display below is shown.



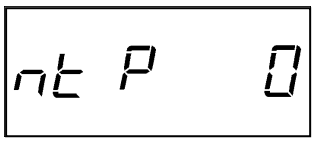
Press [SET] when the display below is shown, and press [+] or [—] to show “YES.” Pressing [SET] again will restore the default settings.



Perform the network setting via network by using the PC. For the setting method, refer to the instruction manual for network connection stored in the accessory USB memory.

13. 2 Checking of Network Operation Status

Press [FUNC] when the mode switch is set to Normal Time to show “ntP.”
The operation status of the network is checked and displayed every 10 seconds.
The network is operating normally when “0” is displayed as shown below.



Caution	**The time server function will not operate during a power failure. Connect the Yearly Programmable Timer to the network after the time correction is made, and it is ensured that it indicates the time accurately.**

1 4. TIME CORRECTION

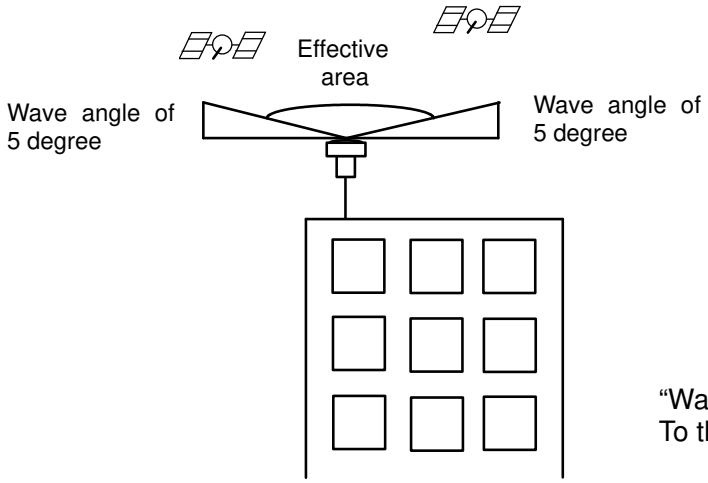
14.1 Time Correction with GNSS (when GNSS receiver [GNS-300] is connected)

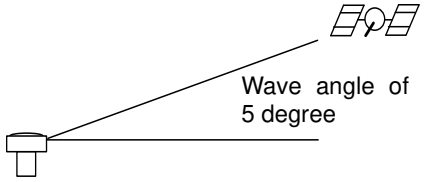
■ **What is GNSS?**

GNSS (Global Navigation Satellite System) is a general name of the navigation satellite system (GPS of the United States, QZSS of Japan, GLONASS of Russia and Galileo of European Union , etc.)

■**Precaution on place for installing GNSS receiver**

Install the GNSS receiver at a place outdoors where unobstructed view can be obtained in 360 degrees at a wave angle of more than 5 degrees. GNSS signal can be received at a place where the GNSS receiver is obstructed from the satellite, but the optimum performance may not be maintained. Therefore, install it at a place where there is no antenna of another device, lightning conductor or high pole. Also, take it into consideration that the reception sensitivity decreases on cloudy or snowy days.GNSS (Global Navigation Satellite System) is a general name of the navigation satellite system (GPS of the United States, QZSS of Japan, GLONASS of Russia and Galileo of European Union , etc.)





“Wave angle” refers to an angle the wave forms To the horizontal line.

CAUTION	**In the case of GPS or QZSS, If any device placed near the GNSS receiver transmits a signal of a frequency near the GPS L1 band (1575.42 MHz), the GNSS receiver may not be able to receive the GPS and QZSS signal.**

15. QT-7800 Series I/F

15.1 Serial Output Signal

(1) Output format and communication settings

Output format

RS-422

Communication settings

Time data consisting of year (last two digits), month, date, day-of-the-week, hour, minute and seconds is output every second.

1. Transmission rate	2,400 bps
2. Synchronization system	Asynchronous
3. Transmission format	Start bit … 1 bit
	Data bit … 8 bit
	Parity bit … None
	Stop bit … 1 bit

(2) Data format and output data timing

Time/calendar data (fixed at 15 bytes)

Data order	Details of data	Character	ASCII code
1	Start	ＳＴＸ	０２Ｈ
2	Tens digit of year	０～９	３０Ｈ～３９Ｈ
3	Units digits of year	０～９	３０Ｈ～３９Ｈ
4	Tens digit of month	０～１	３０Ｈ～３１Ｈ
5	Units digits of month	０～９	３０Ｈ～３９Ｈ
6	Tens digit of date	０～３	３０Ｈ～３３Ｈ
7	Units digits of date	０～９	３０Ｈ～３９Ｈ
8	Day of the week	※１　０～６	３０Ｈ～３６Ｈ
9	Tens digit of hour	０～２	３０Ｈ～３２Ｈ
１０	Units digits of hour	０～９	３０Ｈ～３９Ｈ
１１	Tens digit of minute	０～５	３０Ｈ～３５Ｈ
１２	Units digits of minute	０～９	３０Ｈ～３９Ｈ
１３	Tens digit of second	０～５	３０Ｈ～３５Ｈ
１４	Units digits of second	０～９	３０Ｈ～３９Ｈ
１５	Stop	ＥＴＸ	０３Ｈ

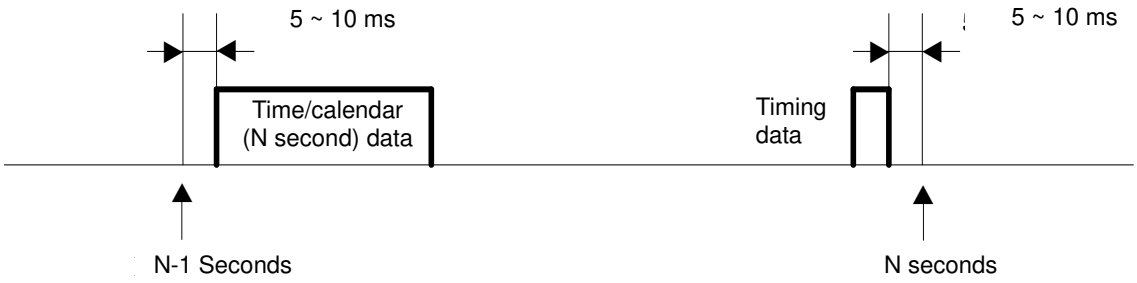
Day of the week (※1)

Character	０	１	２	３	４	５	６
Details	ＳＵＮ	ＭＯＮ	ＴＵＥ	ＷＥＤ	ＴＨＵ	ＦＲＩ	ＳＡＴ

Timing data (fixed at 3 bytes)

Data order	Details of data	Character	ASCII code
1	Start	ＳＴＸ	０２Ｈ
2			Ｅ５Ｈ
3	Stop	ＥＴＸ	０３Ｈ

Output data timing



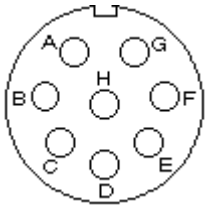
15. 2 Connector Pin Layout of GNSS Receiver GNS-300

GNSS Receiver GNS-300 (Round receptacle connector 8-pin female)

Pin No.	Signal	Direction
A	Power (+ 4 V)	Out
B	R x (+)	In
C	R x (-)	In
D	GND	—

Pin No.	Signal	Direction
E	Unassigned	—
F	Unassigned	—
G	1PPS-	In
H	1PPS+	In

Connector model No.: R03-R8F (Tajimi)
Mated plug: R03-PB8M (Tajimi)



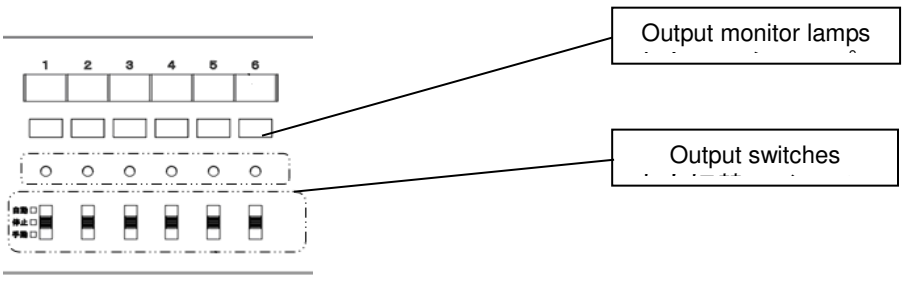
Pin layout (on the rear)

※This connector is used to connect the optional GNSS Receiver (GNS-300) with the Yearly Programmable Timer.

※The electrical specifications of the interface are in accordance with RS-422.

16. LEDS ON FRONT PANEL

16. 1 Output Monitor Lamps



16. 2 Power Monitor

(1) While the Yearly Programmable Timer is operating on AC power:
The monitor turns on when the AC power is supplied.

(2) The monitor flashes during power failure when the AC power is not supplied, and the Yearly Programmable Timer is powered by the battery.

17. INSTALLATION

⚠ WARNING		
Prohibition against unauthorized installation and electrical engineering work	Never attempt any of installation work, electrical engineering, and any of the jobs instructed to the engineering outfit ("Installation Instructions"). All of these jobs must always be commissioned to your engineering outfit because they involve electric shock hazards, fire hazards and falling hazards.	

For the engineering outfit

17.1 Precautions

- **Selection of location for installation**

⚠ WARNING	The Yearly Programmable Timer is designed for indoor use, and must not be installed outdoors. Otherwise, rainwater may infiltrate into the product to cause electric shock or fire accident.	

⚠ WARNING	It must not be installed in the bathroom or washing area or other electric shock- or fire accident-prone damp places.	

Select an installation place least susceptible to the influence of temperature, humidity and vibration.
The ambient temperature of the selected place should be held within the range of -10℃ to +50℃.

- **Load-bearing capacity**

⚠ WARNING	Make sure that the wall or other structure onto which the Yearly Programmable Timer is to be mounted has a sufficient strength to bear up against its weight. If the structural strength is not sufficient, it may yield to the weight of the Yearly Programmable Timer or external shocks, letting the Yearly Programmable Timer fall to cause fatal accidents.	

- **Power supply**

⚠ WARNING	Be sure to use only AC 110 V 50/60 Hz with QT-78X01, and only AC 220 V 50/60 Hz with QT-78X02. If any other power supply than specified is used, electric shock or fire accident may result.	

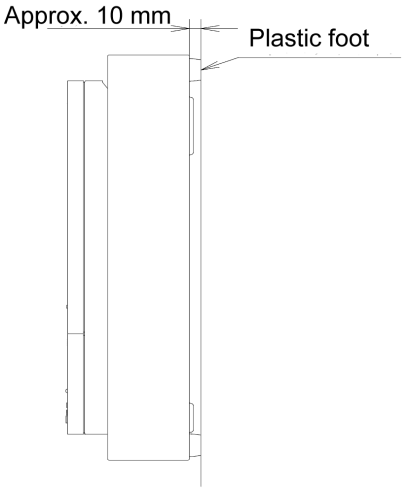
Use an exclusive power supply as the clock system runs on a 24-hour basis.

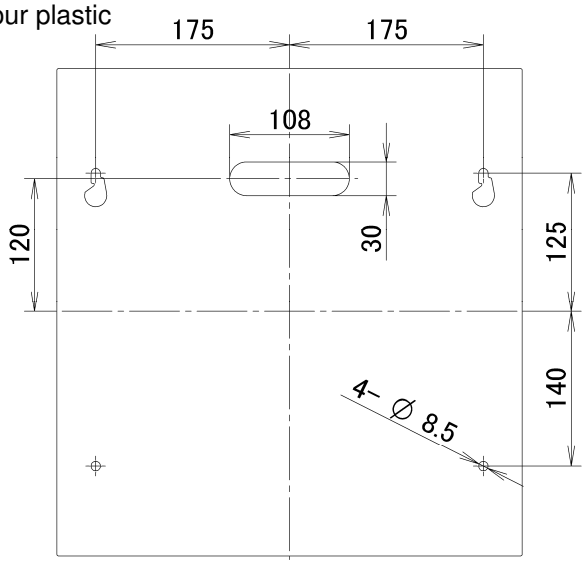
- **Electrical engineering work**

⚠ WARNING	Before wiring the input/output terminal blocks, make sure that AC power is not supplied, and that the battery is not connected. You are warned against working on live circuits as they involve fatal electric shock hazards.	

17.2 Installation Work

To install the Yearly Programmable Timer, use four ϕ6 mm~8 mm installation bolts to fix it securely. When mounting it on to the concrete wall, use AY plugs and bolts. Mounting hole drilling template included with the product is convenient in such case.
If it is necessary to provide clearance between the product and the wall for wiring and other reasons, attach the accessory four plastic feet on the rear of the product.





WARNING

When mounting on to the concrete wall, use AY plugs and bolts. Never use wood screws to fasten the product. Wood screws may yield under wind pressure and vibrations, and let fall the product to cause fatal accidents.

WARNING

Be sure to tighten each bolt into the anchor plug fully. Otherwise, the product may come off from the wall as the bolts may loosen off under the influence of wind pressure or vibrations, causing fatal accidents.

17.3 Precautions on Wiring and Installation of Secondary Clocks

- Cables are wired to the input/output terminal blocks located inside the case at the center. Open up the front panel from the bottom, and hook it to the stay on the left to keep it open.
- Bring in the cables inside the product through the cable holes on its rear.
- To connect the cables to the input/output terminal blocks, use the attached insulated crimp terminals to fix the cables securely.
- When connecting the secondary clocks, check that the (+) and (-) terminals are properly connected. Otherwise, loss/gain of 30 seconds will be caused.
- To connect with the secondary clock, use two colored vinyl wires of different colors (red an black). If the secondary clock located farthest from the product is within 100 m away, use ϕ1.2 mm wire, and if it is within 300 m away, use ϕ1.6 mm wire.
- The capacity of the circuit for secondary clocks is 360 mA. If the current consumption of each secondary clock is 12 mA, up to 30 clocks can be connected to the yearly Programmable Timer. Note that the current consumption of clock differs depending of the size and type of the clock.
- Before installing the secondary clocks, set their hands to the same time (12 o'clock, for example). To do so, open the movement cover, and turn the wheel with fingers. In case of clocks without glass on the dial, turn the minute hand directly.

WARNING

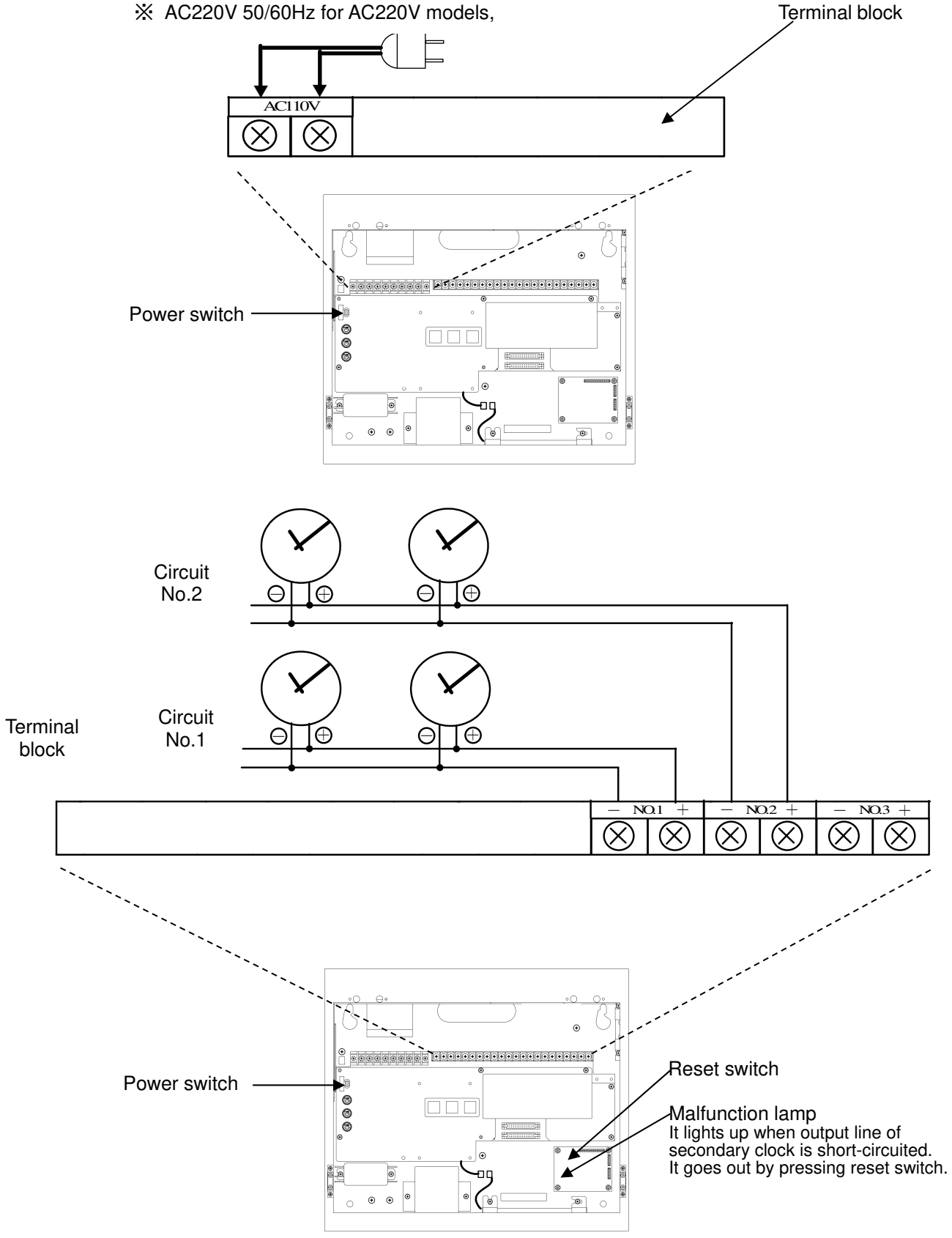
When opening the front panel, fix the stay securely to keep the panel open. Otherwise, the front panel will be closed by touching it accidentally, causing a malfunction of the product as well as fatal accidents.

17.4 Connection of Power Supply and Secondary Clocks

・Connect the power supply of AC 110 V 50/60 Hz, and secondary clock according to the illustrations below.

AC110V 50/60Hz:

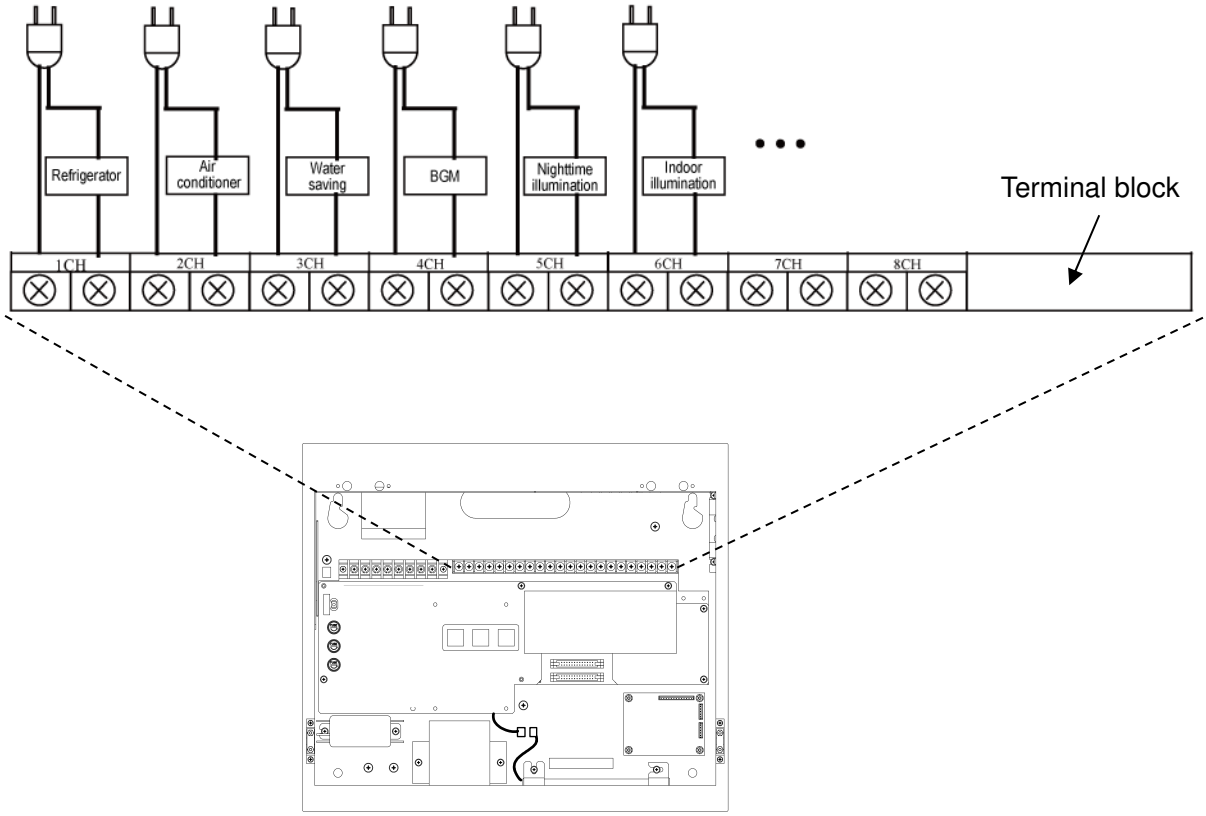
※ AC220V 50/60Hz for AC220V models,



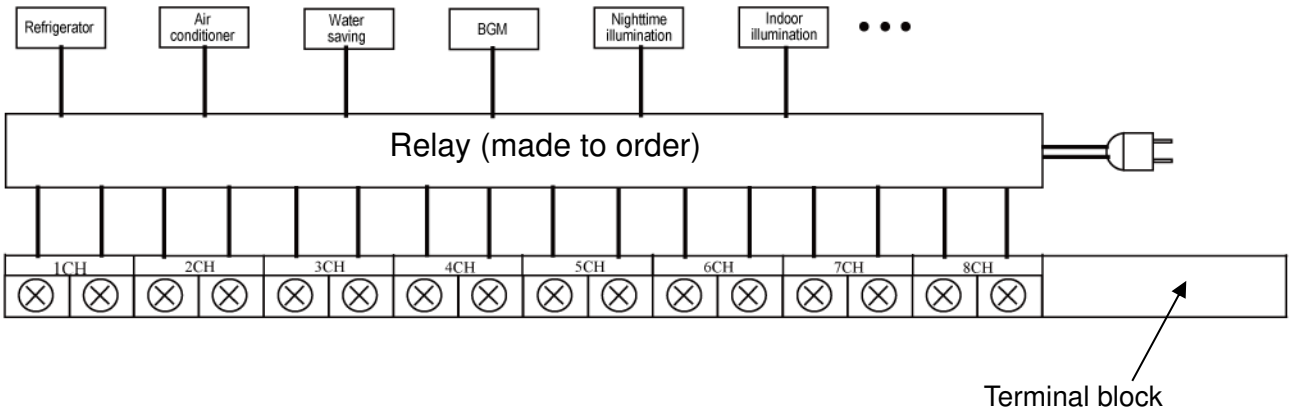
17.5 Connection of Timer Output

- Refer to the diagram below to connect the timer output and the devices to be controlled.
- Select the wire to be used on the basis of the current consumption of the device to be connected.
- Connect the device securely, using the accessory crimp terminal.
- The timer output delivers dry contact output signals. No voltage is generated.

When the load is within the contact output rating:

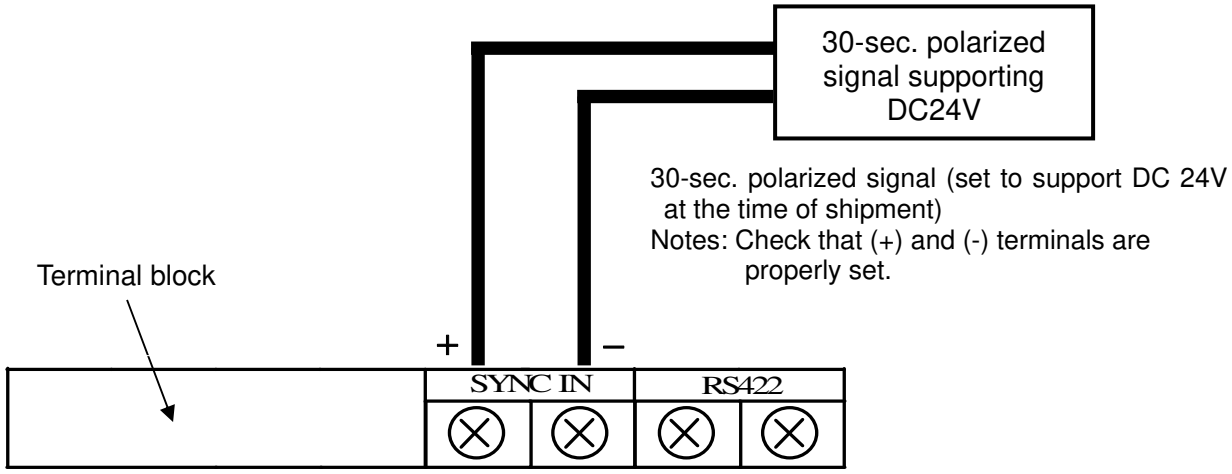


When the load exceeds the contact output rating:



17.6 Connection of External Synchronization Input

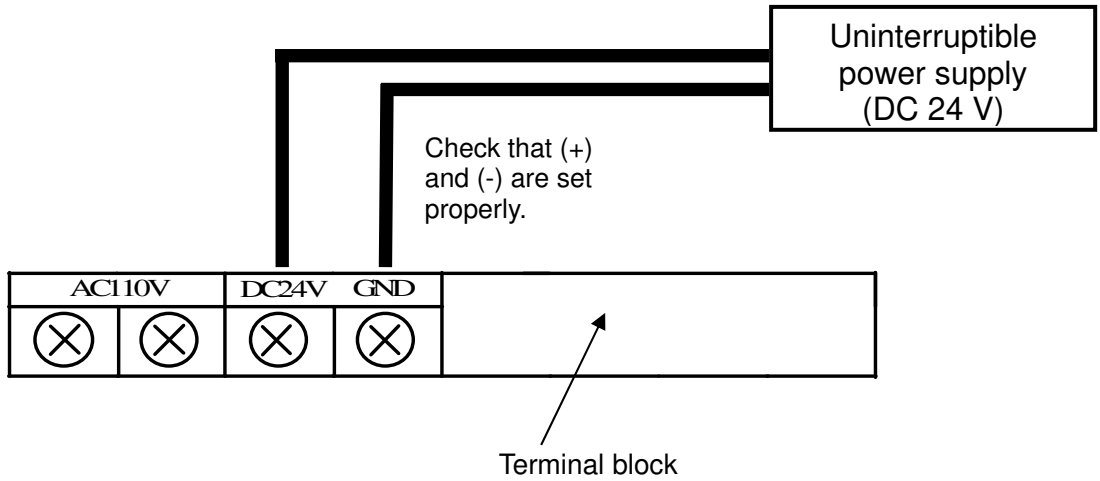
- By connecting the 30-sec. polarized signal for driving secondary clocks of an external master clock to the external synchronization input, the Yearly Programmable Timer operates in sync with the external master clock.
- Even if the external master clock stops operating, the Yearly Programmable Timer continue operating on its own.
- The Yearly Programmable Timer will not synchronize with the quick advance signal from the external master clock but only with a precise 30-sec. polarized signal.
- If the input signal involves loss/gain of more than 15 seconds from its internal clock, the Yearly Programmable Timer will not operate in sync with the external signal.
- It synchronizes with the external master clock only while the mode switch is set to Normal Time.
- At the time of shipment from the factory, the Yearly Programmable Timer has been so preadjusted that it can be connected with SW-302. To connect SW-302, refer to its instruction manual.



17.7 External DC Power Supply Input (DC 24 V)

This terminal is used to supply backup power for the timer output relay in the event of power failure. Connect uninterruptible DC power supply to it.

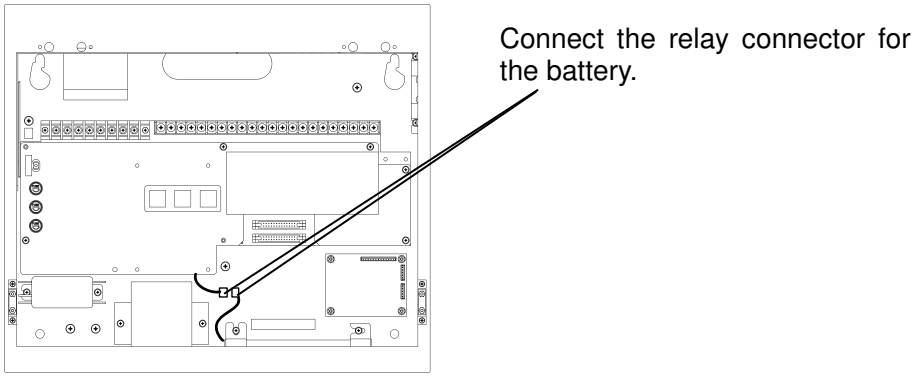
※Inputting DC 24 V to this terminal only will not energize the whole circuit for the daily use. Be sure to input AC power supply for the normal operation of the Yearly Programmable Timer.



17.8 Connection of Battery

QT-7800 Series uses Ni-Cd battery or Ni-MH battery for driving and controlling secondary clock.

WARNING	Connect the battery after all the installation and electrical works are completed. Before connecting the battery, make sure that the power is not supplied to the product. Otherwise, an electric shock may result.

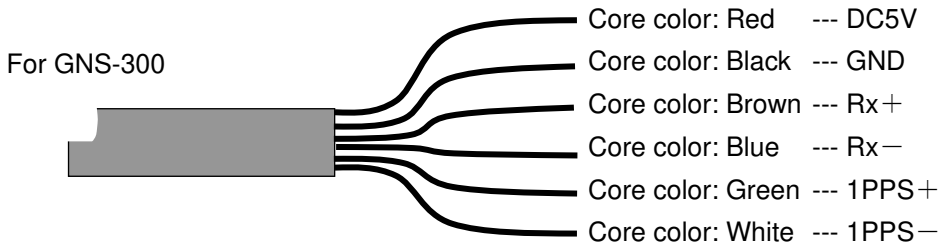


17.9 Connection of GNSS Receiver

● **Extension of the Cable Connecting GNSS Receiver**

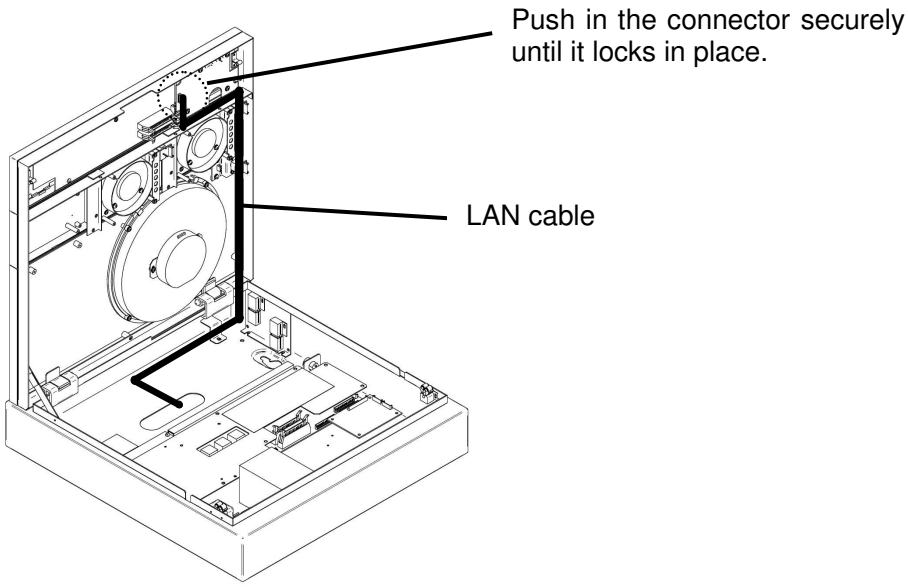
If the cables connecting GNS-300 with the Yearly Programmable Timer need to be extended, use a shielded 6-core cable.

To extend the cable up to 200m or 300m, it is necessary to use 1.25sq or 2.0sq cable, respectively.



17. 10 Network Connection

To connect the LAN cable to the connector on the network substrate, wire it as shown in the illustration below, and fix it with a cable tie.
Use 100Base/TX for the system clock LAN.
Use a LAN cable of Category 5 or higher.



18. TROUBLES YOU CAN SOLVE YOURSELF

Before calling your agent or dealer for service, check the following list for possible troubles that you yourself can remedy without difficulty by following the instructions in this manual.

(1) Power is not turned on.

- Is the specified power supplied to the Yearly Programmable Timer?
- Is the Power Switch turned on?

(2) The time/calendar setting cannot be made.

- Was SET pressed to register the settings?
  (For the time/calendar setting procedure, see "**9. TIME/CALENDAR SETTING**" on page 9.)

(3) The hands of the secondary clock monitor are not adjusted by setting the hand adjuster switch for master clock monitor to "ADJ.".

- Is the hand adjuster switch for secondary clock monitor set at "NOR."?
- Is the malfunction lamp for the secondary clocks lighting up?
  (In that case, check and fix the wiring of the secondary clocks, and press the reset switch to reset the circuit.)

(4) The hands of the secondary clocks are not adjusted by setting the hand adjuster switch for secondary clock monitor to "ADJ.".

- Is the malfunction lamp for the secondary clocks lighting up?
  (In that case, check and fix the wiring of the secondary clocks, and press the reset switch to reset the circuit.)

(5) Time of the secondary clocks loses or gains by 30 seconds.

- Is the (+) and (-) terminals properly connected?

(6) The serial time output is not delivered. (RS-422)

- Is the cable broken or excessively long?
  (Use the cable of a proper material and length according to the input circuit.)
- Is the (+) and (-) terminals properly connected?

(7) Time correction with GNSS is not made.

- If the sky view from the installation place is obstructed by buildings and other objects, install the GNSS receiver at a place where the whole sky can be seen.

If the trouble persists in spite of the troubleshooting procedure above, or if troubles other than cited above occur, call your nearby SEIKO dealer or agent for service.

WARNING

For repair service, contact your nearby SEIKO dealer or agent. Unauthorized disassembly, repair or modification may cause electric shock accidents or fire accidents.

19. BATTERY REPLACEMENT

For the customer

- This product uses a Ni-Cd battery or a Ni-MH battery. It is consumable, and to maintain the integrity of the Yearly Programmable Timer, it should be replaced with a new one every 4 to 5 years.

WARNING	For replacement and collection of the built-in Ni-Cd battery, contact your SEIKO dealer or agent. Do not attempt the battery replacement by yourself. Otherwise, an electric shock accident may result.

For the engineering outfit

- This product uses a Ni-Cd battery or a Ni-MH battery for exclusive use with it. When replacing it with a new one, be sure to use the battery specified for the Yearly Programmable Timer.
- The extent of degradation of the battery cannot be checked by the voltage measurement using a battery tester. To maintain the integrity of the Yearly Programmable Timer, the battery pack should be replaced with a new one every 4 to 5 years.
- When the battery pack has been replaced with a new one, be sure to reconnect the battery cables as they were connected before. Wrong wiring may lead to fuse blow or failure of the product.

WARNING	Use only the battery specified tor the Yearly Programmable Timer.

Ni-Cd

Recycling of the Ni-Cd battery

This product uses a rechargeable battery, which is recyclable. For replacement and collection of the built-in Ni-Cd battery, contact your SEIKO dealer or agent in order to recycle the valuable resources.

Ni-MH

Recycling of the Ni-MH battery

This product uses a rechargeable battery, which is recyclable. For replacement and collection of the built-in Ni-MH battery, contact your SEIKO dealer or agent in order to recycle the valuable resources.

20. REMARKS ON DAILY CARE AND MAINTENANCE

20.1 Replacement of Fuse

WARNING	For replacement of fuse, contact your SEIKO dealer or agent. Do not attempt the fuse replacement by yourself. Otherwise, an electric shock accident may result.

20.2 Care of Enclosure

If the enclosure is found soiled, clean with a soft cloth soaked with a small quantity of neutral syndet diluted with water, and then polish with a dry cloth.

Never use solvents (benzene, thinner, or the like), abrasives (polishing powder or the like), and bristle brushes.

21. WARRANTY

- As a part of SEIKO's customer service policy, the spare parts for the QT-5800 Series Yearly Programmable Timer will be retained for 7 years after sale, and this product will be repaired within this period in principle if it becomes faulty under normal conditions of use. The spare parts here refer to the parts and components essential for keeping the functional integrity of the Yearly Programmable Timer.
- The period for which repair services are available varies over a wide range depending on how your Yearly Programmable Timer has been used. It should be noted that even if repair services are made available, the timing accuracy may not be reinstated. For details, consult your SEIKO dealer or agent.
- It is to be understood that SEIKO reserves the right to use substitutions for parts or accessories for the purpose of repair service.
- If you should have any question or inquiry, please do not hesitate to consult your SEIKO dealer or agent.

22. SPECIFICATIONS

Functions	SPECIFICATIONS				
	Items: Model No.		QT-78101 QT-78102	QT-78201 QT-78202	QT-78301 QT-78302
	Items: Secondary clock circuits		1 circuit	2 circuits	3 circuits
Master Clock	Crystal oscillator frequency		4.194304 MHz		
	Time accuracy		Weekly rate of less than ±0.7 seconds (+5℃~+35℃); 0 seconds after time correction		
	Time display	Master clock	Hour, minute, seconds and date; Year, month, date and day-of-week; Digital 24 hour indication (not displayed during power failure)		
		Monitor clock	30-second interval hand movement		
	Time setting	Master clock	Setting year, month, date, hour and minute and resetting seconds to “00”		
		Monitor clock	60X speed quick advance of hands by APC system		
	Daylight saving time		Set by program imported via USB memory		
	Leap second adjustment		Setting by operation switches * Leap second adjustment is made automatically.		
	Driving of secondary clock	Driving signal	DC 24 V; 30-sec. polarized signal; Pulse width of 0.5 sec.; No-contact		
		Max. number of secondary clocks to drive	30 units	60 units	90 units
			12 mA/unit; 30 units/circuit		
		Maximum driving capacity	360 mA	720 mA	1,080 mA
			360 mA/circuit		
		Backup power	DC 24 V; Built-in sealed Ni-Cd Ni-MH rechargeable battery		
		Battery protection	Overdischarge prevention circuit		
		Signal voltage detection	Signal voltage stopper (stops output when secondary clock driving voltage lowers)		
	External synchronization input		DC24V,30-sec. polarized signal, Every hour (Synchronizable loss/gain range: Less than 15 seconds)		
			RS-422		
	External synchronization output		RS-422		
	Time server		LAN interface: 10BASE-T, 100BASE-Tx Protocol: SNTPv3, SNTPv4		
Yearly Programmable Timer	Control system		Control by CPU		
	Output circuit		8 independent channels; Contact output (make contact)		
	Switching of output operation		Manual switching available for each channel (auto, stop and manual)		
	Load capacity (per circuit)		Resistance load …… .AC 125 V 16 A, AC 277 V 10 A, DC 30 V 10 A Maximum allowable voltage ….AC 277 V, DC 30 V Maximum allowable current ….16 A (AC 125 V), 10 A (DC 30 V) Minimum applicable load ……. DC 5 V 100 mA		
	Output type	Time signal	Minimum unit of designated time setting …. 1 minute Minimum unit of duration setting ……... 1 second Rise time …… Selection from 0, -3, -10 and -30 seconds		
		“Keep”	Minimum unit of designated time setting …. 1 minute Minimum unit of duration setting ……... 1 second;Settable range ….. 1 minute~2 years		
	Program setting		Set on PC and imported via USB memory		
	Program review		Indicated on LCD digital display by switch operation		
	Program	Yearly program	Designating up to 99 weekly programs for Basic, Period, National Holiday, and Special Day settings. Programmable period … 2 years including this year (Basic setting can be used repeatedly)		
		Weekly program	Maximum number of weekly programs engaged … 99 Programmable period … 1 week (can be used repeatedly)		
	Maximum number of programs engaged		1,000 steps (total steps in 8 channels)		

Functions	SPECIFICATIONS				
	Items: Model No.		QT-78101 QT-78102	QT-78201 QT-78202	QT-78301 QT-78302
	Items: Secondary clock circuits		1 circuit	2 circuits	3 circuits
General	Input power supply		QT-78X01:AC 110 V±10%, 50/60 Hz,QT-78X02:AC 220V±10%, 50/60 Hz		
	Power consumption		30 W	40 W	55 W
	Power failure backup	Program	Retention of programs in EEPROM for approx. 10 years		
		Master clock	Approx. 5 years (no indication on digital display, counting by internal clock only)		
		Secondary clock drive	30 hours (in case of power failure of more than 30 hours, hands are adjusted automatically after recovery.)		
	Operational temperature range		-10℃~+50℃		
	Outer dimensions		W420×H354×D110 (mm)	W420×H442×D110 (mm)	
	Weight		Approx. 8 kg	Approx. 10 kg	
	Enclosure		Front panel: ABS and steel, pearl gray with a slight gloss Rear panel: Steel, pearl gray with a slight gloss		
Accessories			Plastic foot, 4 pcs; Miniature fuse; Instruction manual; Mounting hole drilling template; Insulated crimp terminal; USB memory; and application software		
Options			GNSS Receiver GNS-300; Rack mounting fittings (in accordance with EIA Standard)		

Option: GNSS Receiver GNS-300

Reception section	Power supply	DC 4.0 ~ 5.0 V 45mA (supplied by QT-7800 Series)
	Satellite system	GPS, QZSS, GLONASS, Galileo
	Reception sensitivity	GPS:-148dBm , QZSS:-148dBm , GLONASS:-145dBm , Galileo:-138dBm
Time correction	Correction accuracy: ±5ms , Number of time corrections: 24 times/day every hour on the hour	
Operational temperature range	-20℃ ~ +60℃, rain-proof type	
Structure	Outer dimensions	W142 x H65 x D110 (mm)
	Cable length	Approx. 10 m (shielded 6-core cable) Extension cable: 1.25 sq - 200 m or less, 2.0 sq - 300 m or less
	Weight	Approx. 400g (only main unit)

Option: Rack Mounting Fittings

EIA compliant	E354	Outer dimensions: W480×H354 (mm) (when mounted to the main body) Weight: Approx. 2 kg Casing finish: steel with coating finish (pearl gray with a slight gloss)
	E442	Outer dimensions: W480×H442 (mm) (when mounted to the main body) Weight: Approx. 2.5 kg Casing finish: steel with coating finish (pearl gray with a slight gloss)

※1 : When the Yearly Programmable Timer is used in a region using other than the rated voltage (AC 110 V or AC 220 V), use it within the voltage range of AC 99 V ~ 121V (AC 110 V ± 10%) or AC 198 V ~ 242 V (AC 220 V ± 10%) inclusive of voltage fluctuations.

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