SEIKO

QUARTZ MASTER CLOCK
QC-5500 Series

OPERATING MANUAL

Thank you for purchasing SEIKO Quartz Master Clock QC-5500 Series.
Before using your SEIKO Quartz Master Clock, please be sure to carefully read through this manual as it has been designed to provide you with information for correct handling, use and maintenance necessary for safe, long-lasting and trouble-free operation. Keep this manual handy for ready reference.

SEIKO TIME CREATION INC.

I-6498E-5

－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 QUARTZ MASTER CLOCK. 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 Model QC-5500 Series Quartz Master Clock.

－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

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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 ("For the engineering outfit"). 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 Quartz Master Clock 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 Quartz Master Clock 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 Quartz Master Clock 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 Quartz Master Clock 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 Quartz Master Clock is used again without being reconditioned, an electric shock or fire may result.	
Prohibition against handling with wet hands	Never operate the Quartz Master Clock 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 the rated voltage with the Quartz Master Clock. 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 Quartz Master Clock. 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. Otherwise, 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.

● **Safety instructions to the engineering outfit**

For the engineering outfit

⚠ WARNING

Precautions on installation work

Selection of installation location	The Quartz Master Clock is designed for indoor use, and must not be installed outdoors. Otherwise, rainwater may infiltrate into it to cause electric shock or fire accident.
	Do not install it in the bathroom, 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 under wind pressure and vibrations, letting fall the product to cause fatal accidents.
Mounting onto the concrete wall	When mounting on to the concrete wall, use AY plug 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 bolts	Be sure to tighten each installation bolt. 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 no AC voltage is 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 Quartz Master Clock 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 the rated voltage with the Quartz Master Clock. 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 Quartz Master Clock.
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 QC-5500 Series is a high-precision quartz master clock equipped with a wide variety of functions that meet the needs of the users, such as synchronization output via RS-422 and daylight saving time setting. Models operating on AC 110 V (QC-55X01B) and AC 220 V (QC-55X02B) are available.
By connecting the GNSS Receiver (GNS-300) for exclusive use with QC-5500 Series, the internal clock can be adjusted automatically on a regular basis.

3. FEATURES

(1) Master clock function (QC-5510XB, QC-5520XB and QC-5530XB)

Up to 30 secondary clocks can be connected to each channel (if the current consumption of each secondary clock is 12 mA).

(2) External synchronization function

By connecting with an external master clock generating 30-sec polarized signal output, the loss/gain of the clock is corrected automatically.

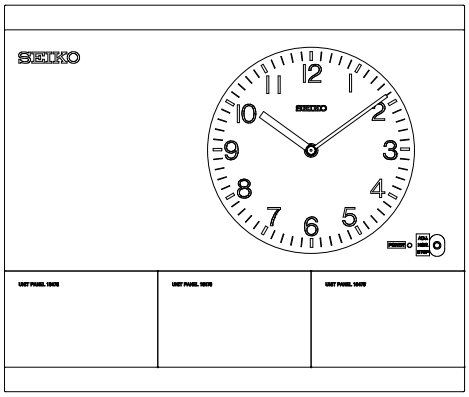
(3) Time correction function

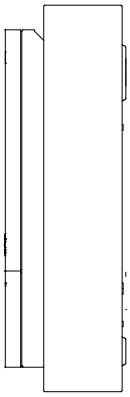
By connecting with the GNSS Receiver (GNS-300), the time correction is made automatically.

4. ACCESSORIES AND SPARES

Accessories and Spares	Quantity	Remarks
Plastic foot	4 pieces	
Miniature fuse	3 pieces	250V, 2A
Insulated crimp terminal	See “Remarks” column.	QC-55101B, QC-55102B: M4, 16 pieces QC-55201B, QC-55202B: M4, 18 pieces QC-55301B, QC-55302B: M4, 20 pieces
Instruction manual	1 copy	
Mounting hole drilling template	1 sheet	

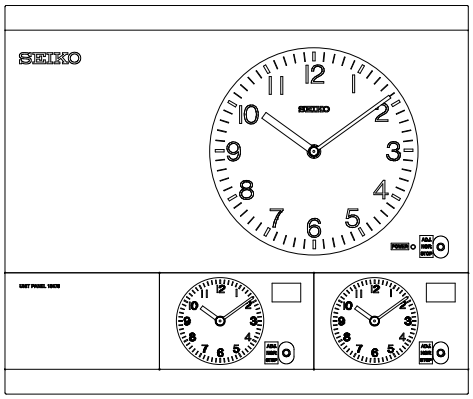
5. LIST OF PRODUCTS

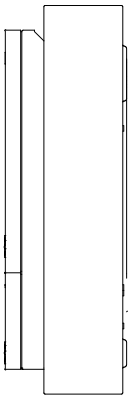




Models with 1 secondary clock circuit

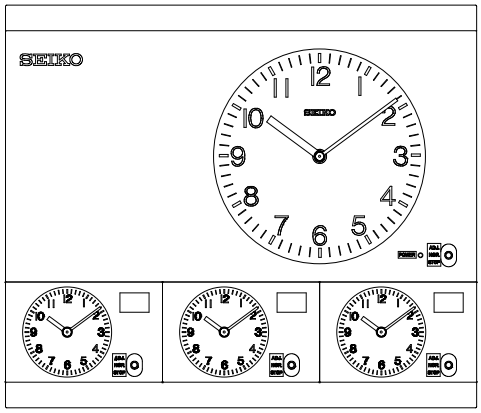
QC-55101B	Drives up to 30 secondary clocks
QC-55102B	Drives up to 30 secondary clocks

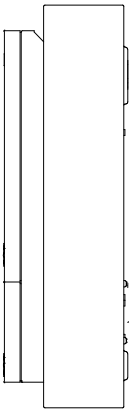




Models with 2 secondary clock circuits

QC-55201B	Drives up to 60 secondary clocks
QC-55202B	Drives up to 60 secondary clocks





Models with 3 secondary clock circuits

QC-55301B	Drives up to 90 secondary clocks
QC-55302B	Drives up to 90 secondary clocks

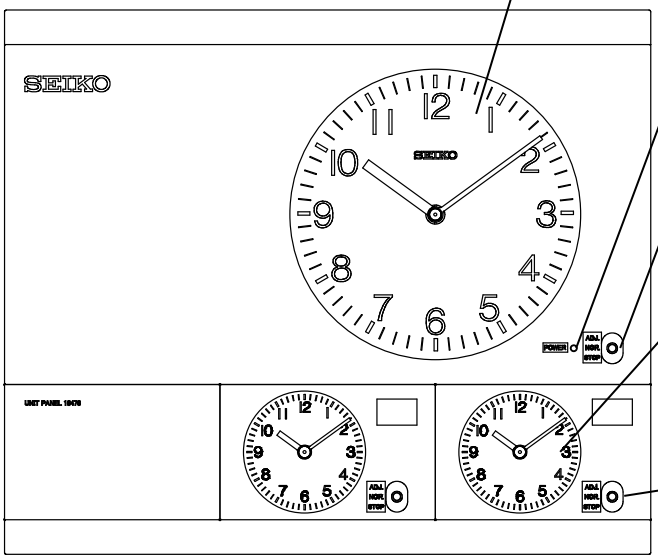
∗By using optional metal fittings E354/E442, the Quartz Master Clock can be mounted in a rack.

6. NOMENCLATURE AND FUNCTIONS (FRONT PANEL)

Master clock monitor

Moves hands at 30-sec steps to indicate current time.
Also serves as a secondary clock monitor for QC-5510XB Series.

Ex.) QC-55202B



Power LED

Hand adjuster switch for master clock monitor

Sets and stops hands of master clock.
Sets hands of all secondary clocks simultaneously.

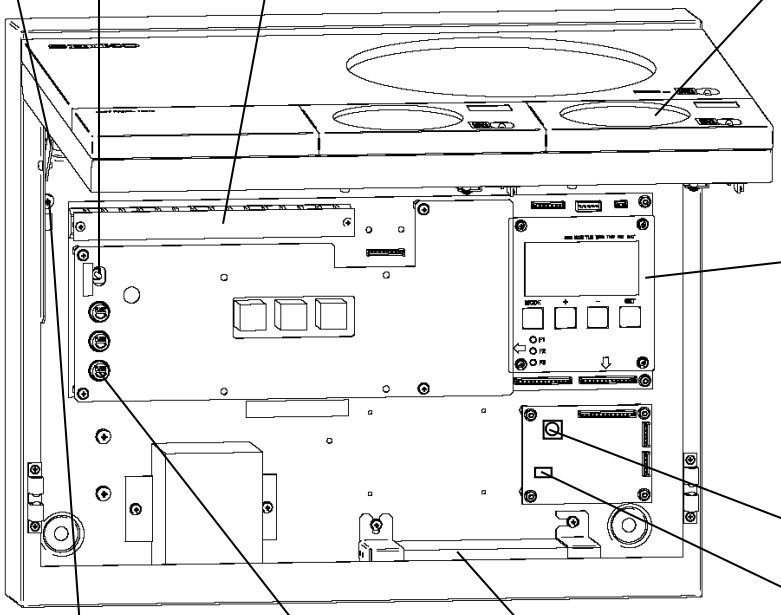
Secondary clock monitor

Monitors for secondary clocks of channel No.1 (left) and No.2.
No secondary clock monitor is provided for QC-5510XB Series.

Hand adjuster switch for secondary clock monitor

Sets and stops hands of secondary clocks.

7. NOMENCLATURE AND FUNCTIONS (INSIDE PARTS)



Stay

Keeps front panel open during installation and wiring

Power switch

Turns ON/OFF AC power supply.

Input/output terminal block

Secondary clock monitor

By turning a wheel on rear side with fingers, hands of secondary clock monitor can be adjusted.

Operation panel

Reset switch

Malfunction lamp

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

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

Battery

8. TIME/CALENDAR CHECKING

8.1 Powering-Up

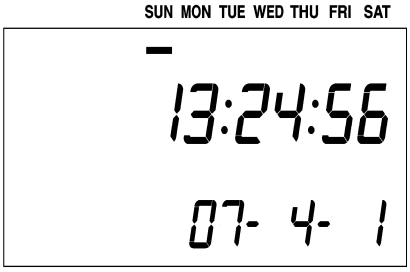
Open the front panel, and set the power switch to “ON”.
Once the power switch is turned OFF, wait at least for 10 seconds, and then, set the switch to “ON” again,

Note:

Please note that, if the power switch is turned ON and OFF in succession in a short time, a malfunction will be caused, or the hands will be mis-aligned.

8.2 Time/Calendar Checking

Check the time and calendar shown on the LCD display of the operation panel.
If the current time/calendar is not shown, set the correct time/calendar, following the procedure in “10.1 Time/calendar setting”.



Note:

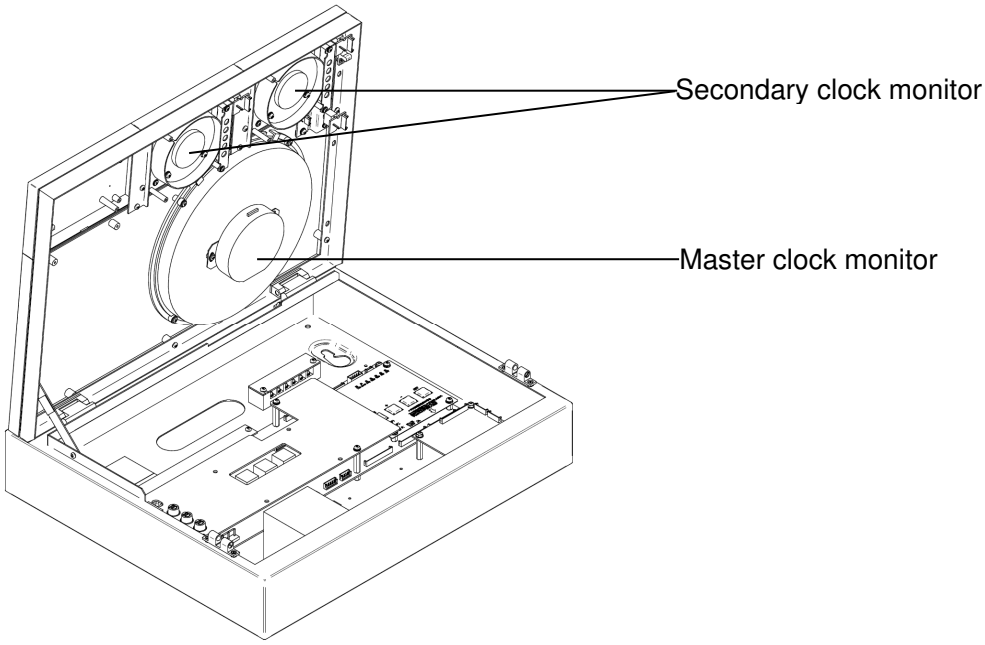
The external synchronization signal can correct the loss/gain within the range of 15 seconds. If the clock loses or gains beyond this range, the time correction will not be made.
Before using the Quarts Master Clock, be sure to set the correct time on the clock.

8.3 Time Setting of Monitor Clocks

(1) Set the hand adjuster switches for all the monitor clock 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 monitor, turn the wheel on its rear.



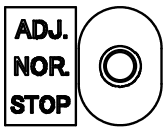
⚠ WARNING	When setting the time of each monitor, do not touch any other part of the control unit than specified. Otherwise, an electric shock may result.

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

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

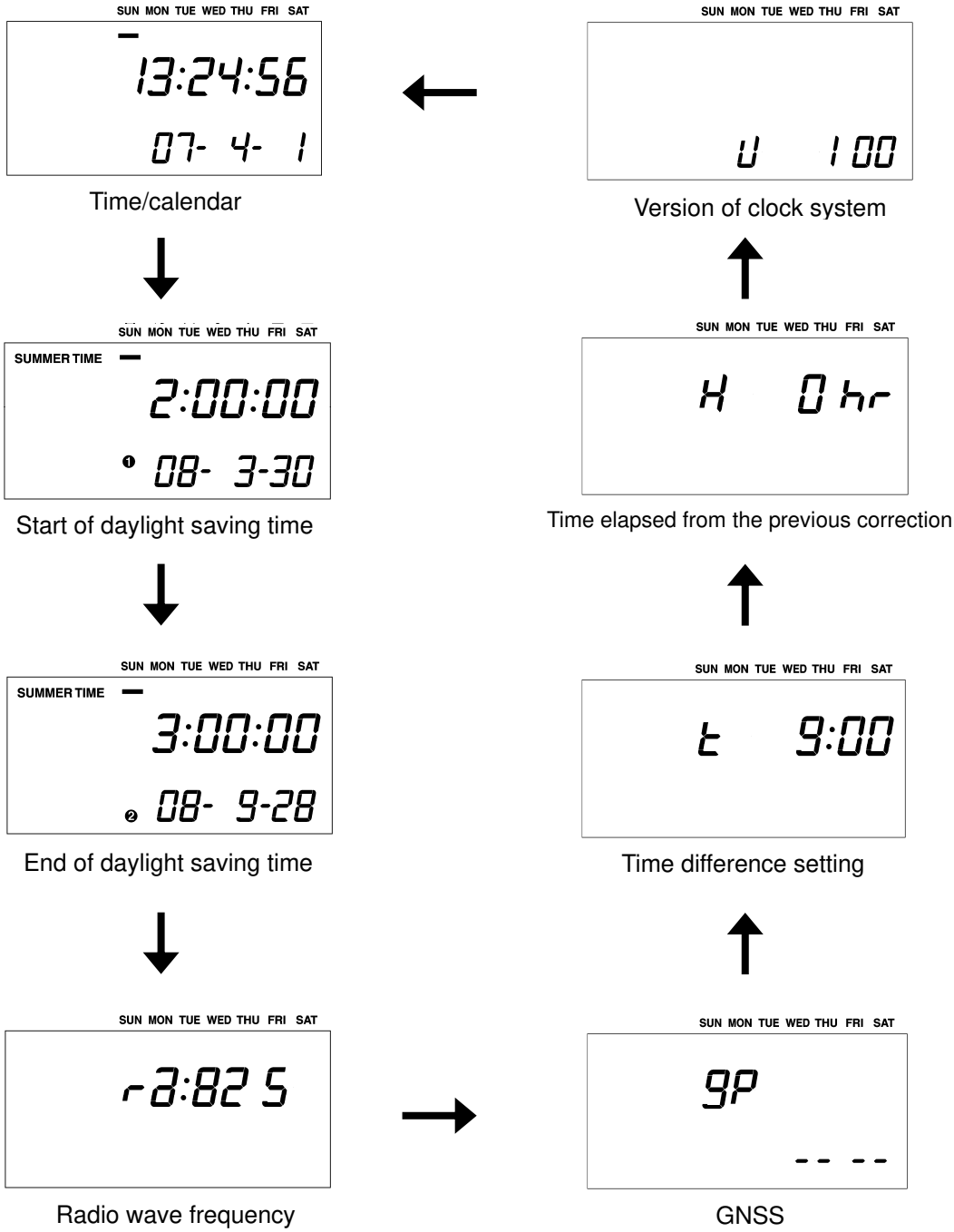
(When the hand adjuster switches for the secondary clock monitors are set at "NOR.", the secondary clock monitor moves correspondingly with the master clock monitor. While the hand adjuster switch of the master clock monitor is set at "STOP", the secondary clock monitor stops moving.)

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. NORMAL MODE

"Normal Mode" refers to the mode where the Quartz Master Clock is normally used as opposed to the "Setting Mode" where setting of the digits is made.
In the Normal Mode, the normal movement of the hands of the secondary clocks, time correction, output of various signals, and other functions are performed.
With each press of MODE button on the operation panel in the Normal Mode, the indication of the LCD display changes in the following order.



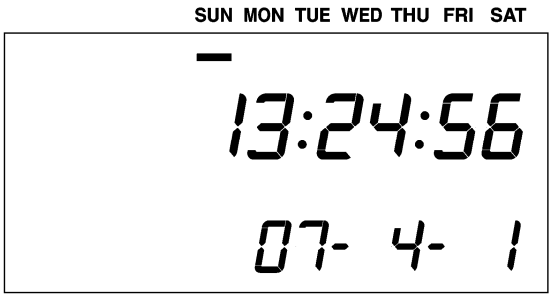
Note:

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

10. SETTING MODE

10.1 Time/Calendar Setting

When the LCD display does not indicate the correct time/calendar, adjust it manually.
By pressing [SET] button when the time/calendar is shown on the display in the Normal Mode, the time/calendar setting function is activated.



Set the flashing digits in order of Year, Month, Date, Hour, and Minute. Then, when the Second digits are flashing, press [SET] button in accordance with a time signal for "00" seconds.
The day of the week is automatically calculated from the Year, Month and Date you have set.

When the respective digits are flashing, the buttons works as follows:

(1) Year setting

[MODE] Pressing the button while the Year digits are flashing will return the display to the Normal Mode.
All the digits you have been setting will be cancelled.

[+] With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
Up to "99" (the year 2099) can be set. After "99", the digits will return to "00" (the year 2000).

[−] With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
The digits are decreased down to "00" (the year 2000). After "00", "99" (the year 2099) will appear.

[SET] The Month digits will start flashing.

(2) Month setting

[MODE] Pressing the button will return the flashing digits from Month to Year.

[+] With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.

[−] With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.

[SET] The Date digits will start flashing.

(3) Date setting

MODE	Pressing the button will return the flashing digits from Date to Month.
＋	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
－	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Hour digits will start flashing.

(4) Hour setting

MODE	Pressing the button will return the flashing digits from Hour to Date.
＋	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
－	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Minute digits will start flashing.

(5) Minute setting

MODE	Pressing the button will return the flashing digits from Minute to Hour.
＋	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
－	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Second digits will start flashing.

(6) Second setting

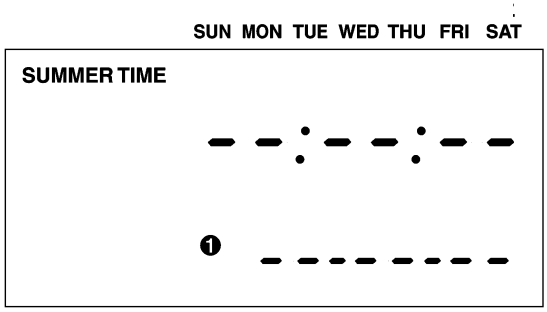
MODE	Pressing the button will return the flashing digits from Second to Minute.
＋	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
－	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	Press the button in accordance with at time signal for “00” seconds. The time and calendar you have set will be registered in the internal clock memory, and the clock will return to the Normal Mode.

Note:

The external synchronization signal can correct the loss/gain within the range of 15 seconds. If the clock loses or gains beyond this range, the time correction will not be made.
Before using the Quarts Master Clock, be sure to set the correct time on the clock.

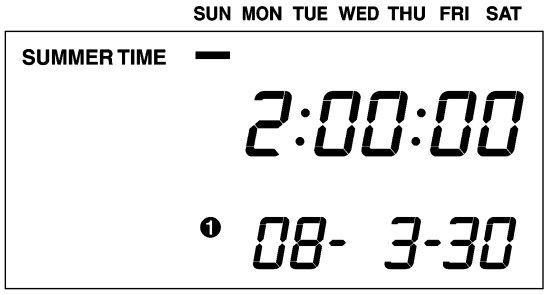
10.2 Daylight Saving Time (Summer Time) Setting

By setting the start and end of the period during which the daylight saving time is in effect, the clocks automatically indicate the time one hour ahead of normal time during the period. Press MODE button to show “Start of daylight saving time” or “End of daylight saving time” while in the Normal Mode, and press SET button to activate the respective setting function.



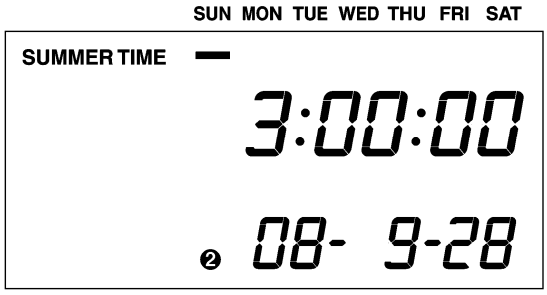
“Start time of daylight saving time” display:
Before setting digits, only “-“ marks are displayed. This also holds true in the case of “End of daylight saving time” display.

Fig. 10. 2. 1



Start of daylight saving time has been set.
The lower row (❶) shows the start date of the daylight saving time.

Fig. 10. 2. 2



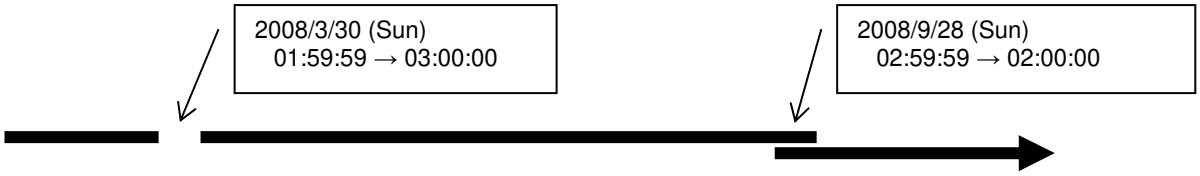
End of daylight saving time has been set.
The lower row (❷) shows the end date of the daylight saving time.

Fig. 10. 2. 3

Figs. 10. 2. 2 and 10. 2. 3 show the example in which the following daylight saving time period has been set.

Period during which the daylight saving time is in effect:
From 2:00 AM on Sunday, March 30, 2008 to 3:00 AM on Sunday, September 28, 2008

Clock indication after the above setting: (All the clock monitors and secondary clocks are automatically adjusted to indicate the daylight saving time from normal time and vice versa.)



Set the flashing digits in order of Year, Month, Date and Hour of “Start of daylight saving time”, and, Month, Date and Hour of “End of daylight saving time”.

(1) Start Year setting

MODE	Pressing the button while the Start Year digits are flashing will return the display to the Normal Mode. All the digits you have been setting will be cancelled, and the previous setting will remain.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Month digits will start flashing.

(2) Start Month setting

MODE	Pressing the button will return the flashing digits from Month to Year.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Date digits will start flashing.

(3) Start Date setting

MODE	Pressing the button will return the flashing digits from Date to Month.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Hour digits will start flashing.

(4) Start Hour setting

MODE	Pressing the button will return the flashing digits from Hour to Date.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Month digits of End of daylight saving time will start flashing.

(5) End Month setting

MODE	Pressing the button will return the flashing digits from End Month to Start Hour.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Date digits will start flashing.

(6) End Date setting

MODE	Pressing the button will return the flashing digits from Date to Month.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The Hour digits will start flashing.

(7) End Hour setting

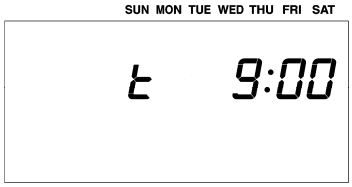
MODE	Pressing the button will return the flashing digits from Hour to Date.
+	With each press of the button, one digit is advanced. The digits are advanced quickly by keeping it pressed.
−	With each press of the button, one digit is decreased. The digits are decreased quickly by keeping it pressed.
SET	The daylight saving time setting you have made will be registered in the internal clock memory, and the clock will return to the Normal Mode.

Note:

During the period for which the daylight saving time has been set, the clocks indicate the time one hour ahead of the normal time.
The digital display will be adjusted as soon as the daylight saving time is in effect, but it takes some time for the clock monitors and secondary clock to be adjusted accordingly (the time required for this adjustment differs depending on the type of secondary clock).

10.3 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 Quartz Master Clock is used.
The time difference can be set within the range from “-12:00” to “+12:00” at 15-minute intervals.



● **Time difference setting**

MODE — Pressing the button while in the Setting Mode will return the display to the Normal Mode. All the digits you have been setting will be cancelled, and the time difference previously set will remain.

＋ — With each press of the button, the time difference is increased by 15 minutes. The digits are advanced quickly by keeping it pressed.

－ — With each press of the button, the time difference is decreased by 15 minutes. The digits are advanced quickly by keeping it pressed.

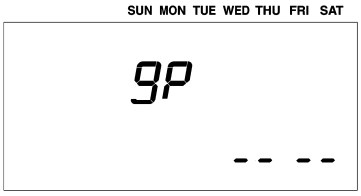
SET — Pressing the button while in the Normal Mode will activate the time difference setting function. In the Setting Mode, press it to register the time difference you have set. The clock will return to the Normal Mode.

[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

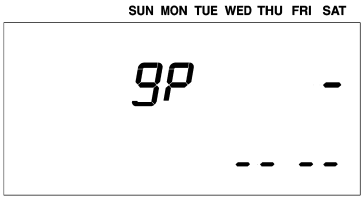
11. TIME CORRECTION WITH GNSS

By connecting the GNSS Receiver (GNS-300) with this Quartz Master Clock, the time correction is made automatically on a regular basis. In the Normal Mode, the time correction is made every hour on the hour. When the GNSS receiver is connected newly, or to manually receive the GNSS time signal, show “GNSS” display in the Normal Mode, and press [SET] button. Checking of the connection status of the GNSS Receiver and time correction are performed.



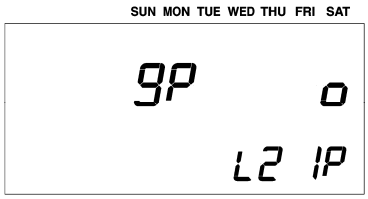
Show “GNSS” display in the Normal Mode.

SET



Press [SET] button to start checking of the connection status of the GNSS Receiver,
and “-” at the right of “gp” flashes alternately if the connection is normal.
When the GNSS Receiver is not connected with the Quartz Master Clock, or the Receiver or the connection is faulty, “-” remains shown. In that case, reconnect the GNSS Receiver with the Quartz Master Clock (remove the connector and attach it securely again), and press [SET] button again to check the connection status.

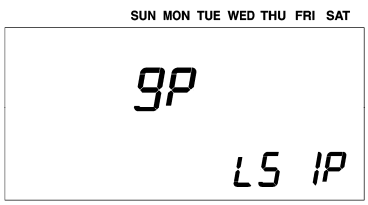
Normal



When the GNSS signal reception has failed, the display shown at left remains displayed.
If the reception failure persists after several attempts of manual reception, it is necessary to relocate the GNSS Receiver to another place (an outdoor place where you can see the whole sky is recommended). Press [MODE] button to return the clock to the Normal Mode.

The display above is shown while the GNSS signal reception is underway, and “o” at the right of “gp” flashes alternately. It takes about 10 minutes to complete the reception. Pressing [MODE] button discontinues the reception and returns the clock to the Normal Mode.

Normal



Time correction is completed.
Press [MODE] button to return the clock to the Normal Mode.

Note:

After the GNSS signal reception has been performed following the procedure above, be sure to return the clock to the Normal Mode. If it is left in the Setting Mode, the regular time correction (made hourly in the case of GNSS) will not be made.

12. QC-5500 Series I/F

12.1 Serial Output Signal

(1) Output format and communication settings

Output format

RS-422

Communication settings

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

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

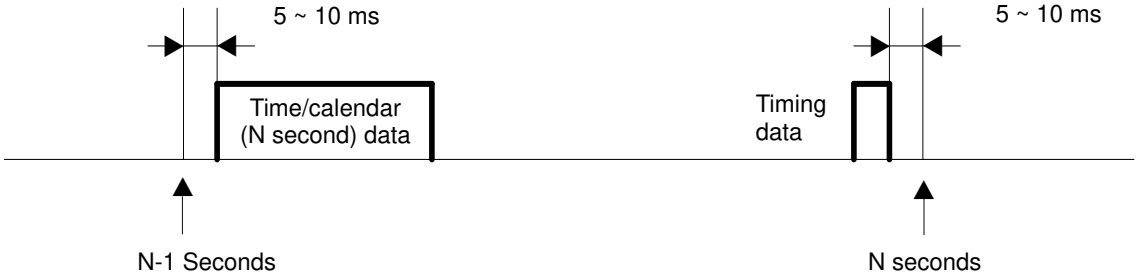
Day of the week (1*)

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



13. POWER LED

(1) When the Quartz Master Clock operates on AC power supply:

The Power LED lights up while AC power is supplied.

(2) When the Quartz Master Clock operates on the backup battery or external DC 24 V power supply during power failure:

The Power LED flashes while AC power is not supplied.

14. 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 ("For the engineering outfit"). 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

14.1 Precautions on Installation

- **Selection of place of installation**

⚠ WARNING	The Quartz Master Clock is designed for indoor use, and must not be installed outdoors. Otherwise, rainwater may infiltrate into it 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 Quartz Master Clock 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 product or external shocks, letting it fall to cause fatal accidents.	

- **Power supply**

⚠ WARNING	Be sure to use only the rated voltage with the Quartz Master Clock. If any other power supply than specified is used, an electric shock or a fire will be caused.	

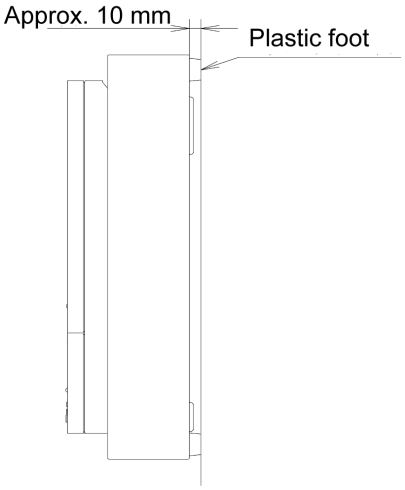
Use an exclusive power supply as the clock system runs 24 hours a day, 365 days a year.

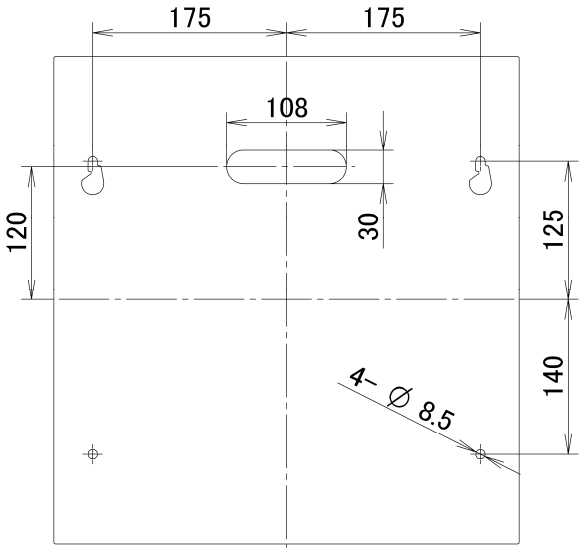
- **Electrical engineering work**

⚠ WARNING	Before wiring the input/output terminal blocks, make sure that no AC voltage is supplied, and that the battery is not connected. You are warned against working on live circuits as they involve fatal electric shock hazards.	

14.2 Installation Work

To install the Quartz Master Clock, use four φ6 mm~8 mm installation bolts to fix it securely. When mounting it on to the concrete wall, use AY plug 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 plug bolts. Never use wood screws to fasten the product. Wood screws may yield under 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 vibrations, causing fatal accidents.

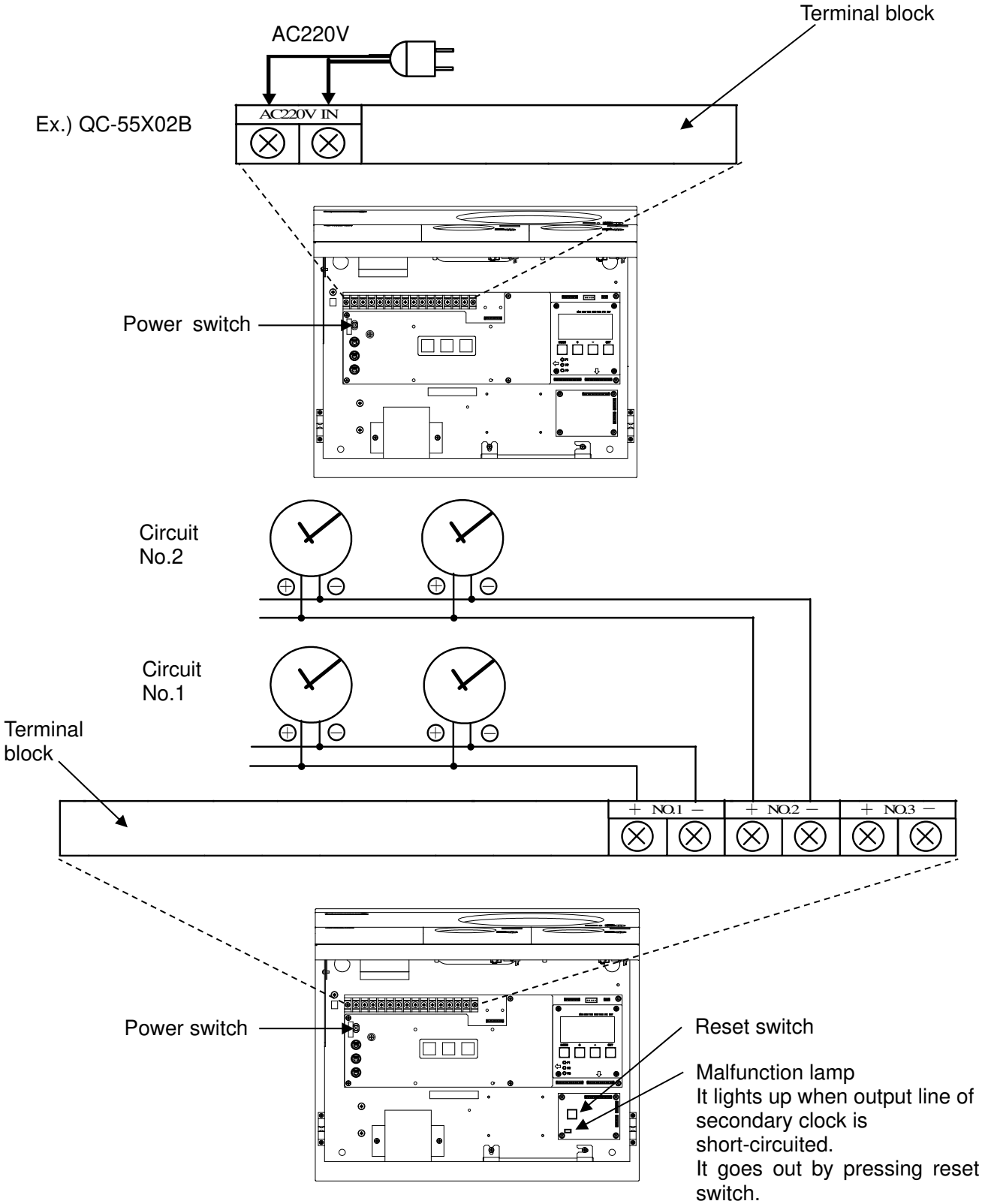
14.3 Precautions on Wiring and Installation of Secondary Clocks

- 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 Quartz Master Clock 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 and black). If the secondary clock located farthest from the Quartz Master Clock 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 per channel. If the current consumption of each secondary clock is 12 mA, up to 30 clocks can be connected to the Quartz Master Clock. Note that the current consumption of clock differs depending on 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 with fingers.

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.

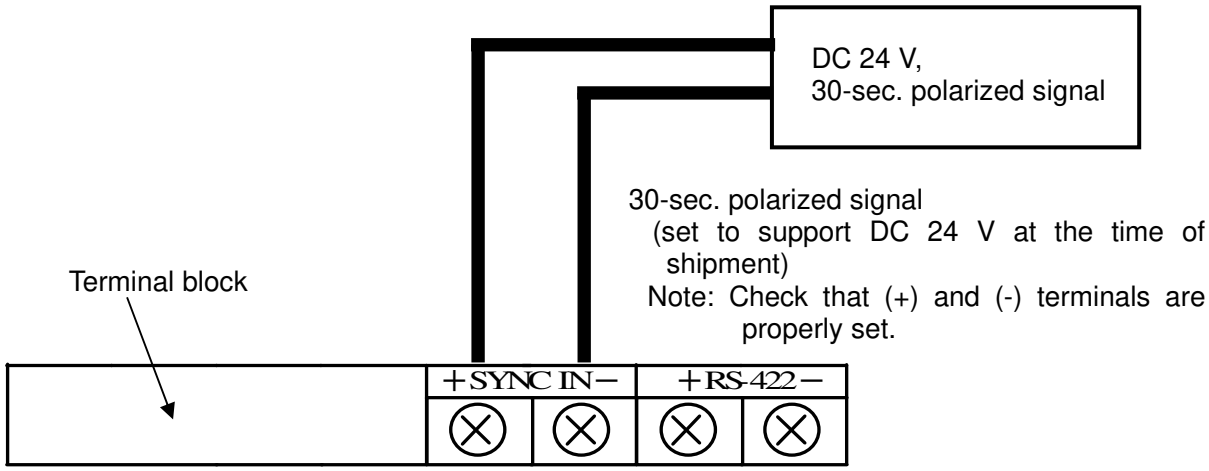
14.4 Connection of Power Supply and Secondary Clocks

・Connect the power supply of AC 220 V or AC 110 V, and secondary clocks according to the illustrations below.



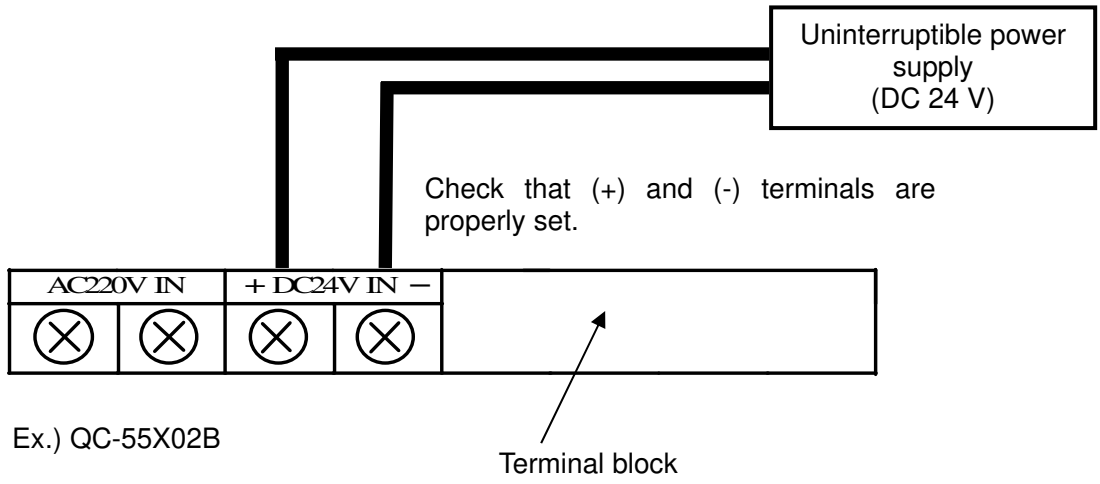
14.5 Connection of External Synchronization Input

- By connecting the 30-sec. polarized signal output of an external master clock to the external synchronization input, the Quartz Master Clock operates in sync with it.
- Even if the external master clock stops operating, the Quartz Master Clock continues operating on its own.
- The Quartz Master Clock will not synchronize with the quick advance signal of 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 Quartz Master Clock will not operate in sync with the external signal.
- It synchronizes with the external master clock while in the Normal Mode.
- At the time of shipment from the factory, the Quartz Master Clock has been preadjusted to support DC 24 V.



14.6 External DC Power Supply Input (DC 24 V)

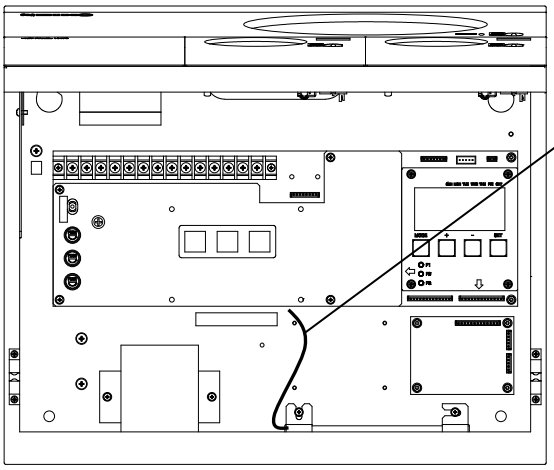
Connect uninterruptible DC power supply to these terminals.



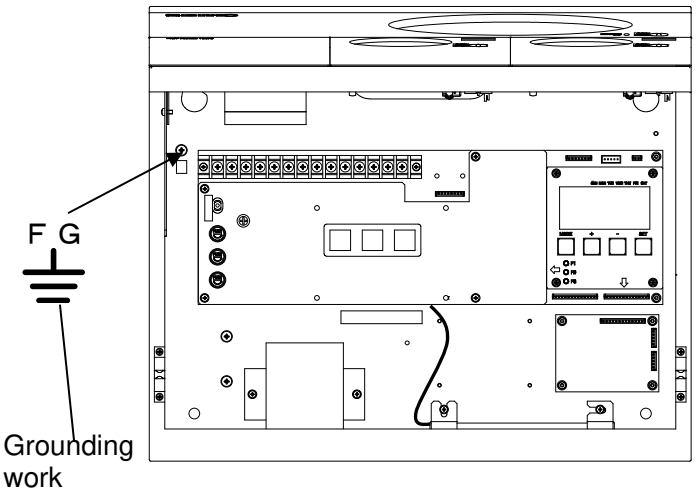
14.7 Connection of Battery

QC-5500 Series uses a rechargeable battery pack for secondary clock driver and control circuit.

WARNING	Connect the battery after all the installation and electrical works are completed. Before connecting the battery, make sure that no power is supplied to the product. Otherwise, an electric shock may result.



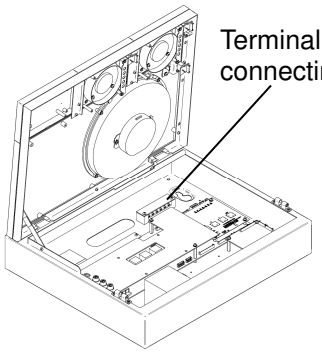
14.8 Grounding

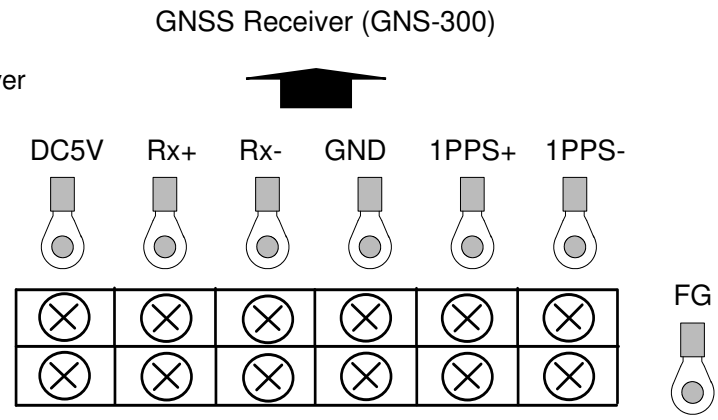


WARNING	Ground the Quartz Master Clock by connecting a grounding conductor to its grounding terminal. This is important for the prevention of electric shock hazards in case of troubles such as earth leakage fault. The grounding work must be Class D or higher in rating.

14.9 Connection of GNSS Receiver

When connecting the GNSS Receiver (GNS-300) with the Quartz Master Clock, connect the cables as illustrated below.





WARNING

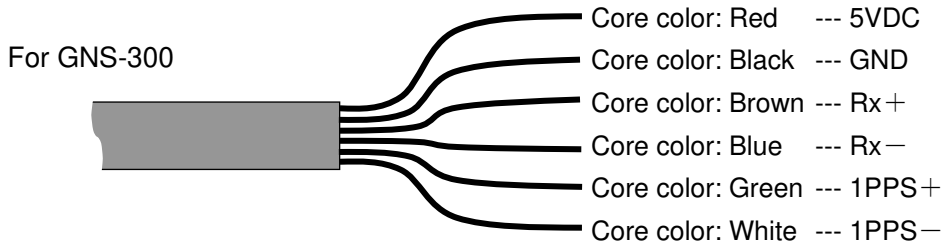
When connecting the GNSS Receiver with the Quartz Master Clock, connect the shield of the shielded cable to “FG”.

● Installation of GNSS Receiver

When the Quartz Master Clock is used with the optional GNSS Receiver (GNS-300), it is necessary to install it before Clock is used.
Install the GNSS Receiver at a place where the whole sky can be seen, and fix it securely lest it should drop.
If the sky view from the installation place is obstructed by buildings and other objects, the radio wave reception from the GNSS satellite will be disturbed.
Do not install the Receiver at a place where it is exposed to vibration or strong electromagnetic waves.

● Extension of the Cable Connecting GNSS Receiver

If the cables connecting GNS-300 with the Quartz Master Clock 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.



15. 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 Quartz Master Clock?
- Is the Power Switch turned ON?

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

- Is the time/calendar setting procedure completed?
  If the setting procedure is still in progress, any of the year, month, date, hour, minute and second digits are flashing.
  (For the details of the time/calendar setting procedure, see "**10.1 Time/Calendar Setting**".)

(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 cannot be made.

- Are the cables connecting the GNSS Receiver properly connected to the terminal block?
- If the sky view from the installation place of the GNSS Receiver is obstructed by buildings and other objects, relocate it to a place where the whole sky can be seen.

If the above troubleshooting still fails, 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.

16. BATTERY REPLACEMENT

For the customer

- This product uses a rechargeable battery pack. It is consumable, and to maintain the integrity of the Quartz Master Clock, 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

- The Quartz Master Clock uses a rechargeable battery pack for exclusive use with it. When replacing it with a new one, be sure to use the battery specified for this product.
- The extent of degradation of the battery cannot be checked by the voltage measurement using a battery tester. To maintain the integrity of the Quartz Master Clock, 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 Quartz Master Clock.

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.

17. REMARKS ON DAILY CARE AND MAINTENANCE

17.1 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.

17.2 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.

18. WARRANTY

- As a part of SEIKO's customer service policy, the spare parts for the QC-5500 Series Quartz Master Clock 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 Quartz Master Clock.
- The period for which repair services are available varies over a wide range depending on how your Quartz Master Clock 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.

19. SPECIFICATIONS

QC-5500 Series Quartz Master Clock

Functions	SPECIFICATIONS			
	Model No.	QC-55101B QC-55102B	QC-55201B QC-55202B	QC-55301B QC-55302B
	Number of 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℃); no accumulated error after time correction		
	Time display – Master clock	Year, month, date, hour, minute, and seconds; and Digital display in 24-hour indication (not displayed during power failure)		
	Time display – Monitor clock	30-second interval hand movement		
	Time setting – Master clock	Setting of year, month, date, hour, minute and seconds		
	Time setting – Monitor clock	60X speed quick advance of hands by APC system		
	Daylight saving time	Setting of year, month, date and hour for start date, and month, date and hour for end date		
	Secondary clock driver – Driving signal	DC 24 V 30-sec. polarized signal; Pulse width of 0.5 sec.; No-contact		
	Secondary clock driver – Max. number of secondary clocks to drive	30 units	60 units	90 units
		12 mA/unit; 30 units/circuit		
	Secondary clock driver – Maximum driving capacity	360 mA	720 mA	1,080 mA
		360 mA/circuit		
	Secondary clock driver – Backup power	DC 24 V; Built-in rechargeable battery		
	Secondary clock driver – Battery protection	Overdischarge prevention circuit		
	Secondary clock driver – Signal voltage detection	Signal voltage stopper function (stops output when secondary clock driving voltage lowers)		
	External synchronization input	DC 24 V 30-sec. polarized signal; Every hour except 7, 19, 0, and 12 o'clock; Synchronizable loss/gain range … Less than 15 seconds		
	External synchronization output	RS-422		
	GNSS time correction	Number of times of time correction: 24 times a day (every hour on the hour when GNSS Receiver is connected)		
Input power supply *1		QC-55X01B : AC 110 V ± 10 % or DC 24 V ± 10 % QC-55X02B : AC 220 V ± 10 % or DC 24 V ± 10 % * External synchronization output and GNSS time correction are performed only when the clock is operating on AC power supply.		
Power consumption		21 W	32 W	42 W
Power failure backup	Master clock	Approx. 5 years (no indication on digital display, counting by internal clock only)		
	Secondary clock driver	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)		
Weight		Approx. 7.0 kg	Approx. 7.2 kg	Approx. 7.5 kg
Enclosure		Front panel: ABS and stainless steel, pearl gray with a slight gloss Rear panel: Stainless steel, pearl gray with a slight gloss		
Accessories		Plastic foot, 4 pcs; Miniature fuse; Instruction manual; Mounting hole drilling template; and Insulated crimp terminal		
Options		Rack mounting fittings (in accordance with EIA Standard), GNSS Receiver (GNS-300)		

*1: When using the Quartz Master Clock in a country or region where other than the rated voltage (AC 110 V or 220 V) is used, use it on a voltage between AC 99 V and 121 V (AC 110 V ± 10 %) or between AC 198 V and 242 V (AC 220 V ± 10 %) , inclusive of the voltage fluctuations.

Option: GNSS Receiver (GNS-300)

Reception section	Power supply	DC 3.6 V ~ 5.0 V, 45mA (supplied by QC-5500 Series)
	Satellite system	GPS, QZSS, GLONASS, Galileo
	Reception sensitivity	GPS:-148dBm , QZSS:-148dBm , GLONASS:-145dBm , Galileo:-138dBm
Time correction	Number of times of time correction	24 times a day (every hour on the hour when GNSS Receiver is connected)
	Correction accuracy	±5ms
Operational temperature range	-20℃ ~ +60℃, Water resist is equivalent to IPX3 except connector	
Structure	Overall dimensions	W142 x H65 x D110 (mm)
	Cable length	Approx. 10m (shielded 6-core cable) Extension cable: 200 m or less - 1.25 sq 300 m or less - 2.0 sq
	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: stainless 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: stainless steel with coating finish (pearl gray with a slight gloss)

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