EMMYWATCH

VINTAGE RESTORATIONS

Citizen C460 Movement Parts (1)

TECHNICAL INFORMATION

CITIZEN QUARTZ
Cal. No. C44※
Cal. No. C45※
Cal. No. C46※

●CITIZEN

Contents

§1. OUTLINE

This is combination quartz watch equipped with an EL (electro luminescence) illumination which allows you to read the display even in the dark.

Cal. C440 (Yachting - Magic Light)

- Time Mode
- Calendar Mode
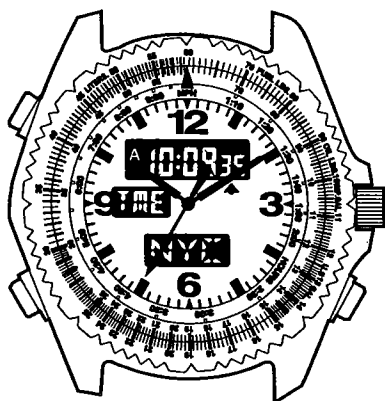- Alarm 1 Mode
- Alarm 2 Mode
- Chronograph Mode
- Race Timer Mode
- Timer Mode
- EL Illumination

Cal. C450/C451 (Combo Mini - Magic Light)

- Time Mode
- Calendar Mode
- Alarm Mode
- Chronograph Mode
- Timer Mode
- EL Illumination

Cal. C460 (Wing Man VI)

- Time Mode
- Calendar Mode
- Alarm 1 Mode
- Alarm 2 Mode
- Chronograph Mode
- Timer Mode
- Zone Setting Mode
- EL Illumination

§2. SPECIFICATION

Caliber No.			C440	C450/C451	C460
Type			Combination quartz watch		
Movement size (mm)			ø30.8 x 5.2t		
Time accuracy (At normal temperature)			Within 20 sec/month (+5°C ~ +35°C / 41°F ~ 95°F)		
IC			1 unit of C/MOS-LSI		
Operating temperature			0°C ~ +55°C (32°F ~ 131°F)		
Converter			Bipolar step motor		
Time adjustment			No adjustment terminal for in the market		
Measurement gate			10 sec.		
Display function	Analog time		Hour, Minute, Second		
	Digital	Time	(A/P), Hour, Minute, Second	(A/P), Hour, Minute, Second	(A/P), Hour, Minute, Second, City name
		Calendar	Month, Date, Day	Month, Date, Day	Month, Date, Day, City name
		Alarm 1	Set time (hour, minute), ON/OF (off)	Set time (hour, minute), ON/OF (off)	Set time (hour, minute) or OFF
		Alarm 2	Set time (hour, minute), ON/OF (off)	—	Set time (hour, minute) or OFF
		Chronograph	24-Hour measurement (1/100 second unit), Split time measurement		
		Timer	60 minute timer (1 minute unit)	60 minute timer (1 minute unit)	100 minute timer (1 minute unit)
		Race Timer	60 minute timer (15 different lengths of setting), Auto Chronograph function	—	—
		Zone setting	—	—	City name ON/OFF, Summertime ON/OFF
Additinal function			EL (electroluminescence) illumination		
Battery	Parts No. / Code		280-44 / SR927W		
	Nominal voltage / capacity		1.55V / 60mAH		
	Life time		Approx. 2 years. (Alarm sound : 40-sec./day, Race timer sound : 5 sec./week, Timer buzzer : 5 sec./day, EL illuminate : 3 sec./day)		

§3. NAME OF PARTS

[CAL. C440]

Hour hand — Button Ⓜ   Digital display
Mode marks — Minute hand
Second hand — Second graphic display
Crown
Button Ⓑ   Button Ⓐ
Button function indicator

[CAL. C450]

Hour hand — Button Ⓜ   1/1 second graphic display
5/1 second graphic display   Minute hand
Second hand   Digital display
Crown
Button Ⓑ   Button Ⓐ
Mode marks

[CAL. C460]

Hour hand — Button Ⓜ   Digital display (1)
Mode display   Minute hand
Crown
Button Ⓑ   Button Ⓐ
Second hand   Digital display (2)
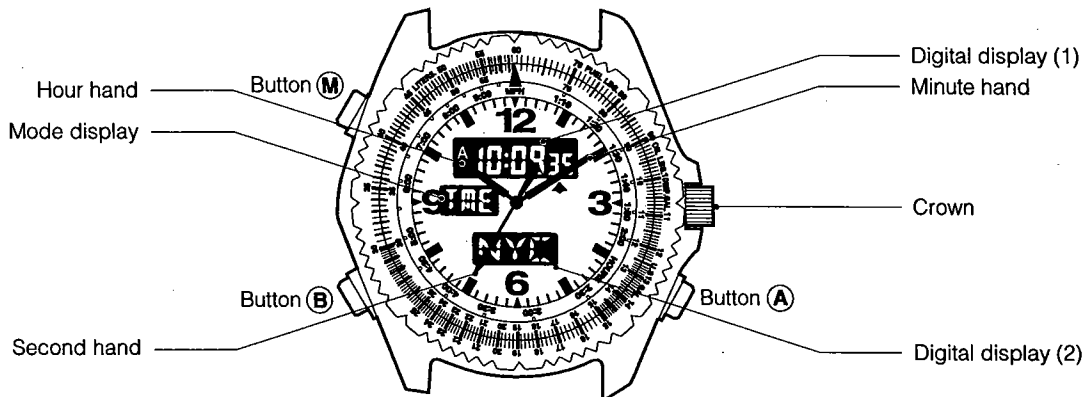
§4. EL ILLUMINATION

EL
EL (electroluminescence) panel is a fluorescent panel which becomes illuminant when voltage is applied to it.

EL Illumination
The EL panel will be illuminated under the following circumstance.

<Cal. C440/C450>

(1) When Ⓐ button is pressed and holded in normal Time and Calendar mode.

(2) When Ⓑ button is pressed to display Split time or Ⓐ button is pressed to stop Chronograph counting in Chronograph mode.

(3) When Ⓑ button is pressed and holded in Timer countdown mode.

<Cal. C460>

(1) When Ⓐ button is pressed and holded in normal Time, Calendar and Zone Setting mode.

(2) When Ⓑ button is pressed to display Split time or Ⓐ button is pressed to stop Chronograph counting in Chronograph mode.

§5. SETTING THE ANALOG TIME

☆ **Common to Cal. C440/C450/C460**

In the case of watches where the crown is a screw type, perform the operation after loosening the screw. Make sure to tighten the screw firmly when the operation has been completed.

Normal position

Time adjustment position
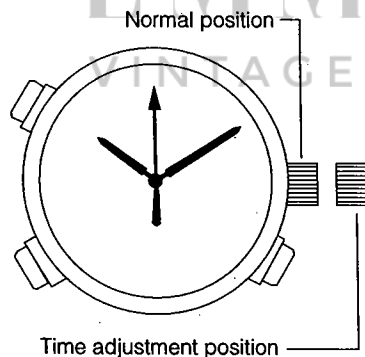
(1) when the second hand comes to the 0-second position, pull the crown out to the time adjustment position.

(2) Turn the crown to align with the correct time.
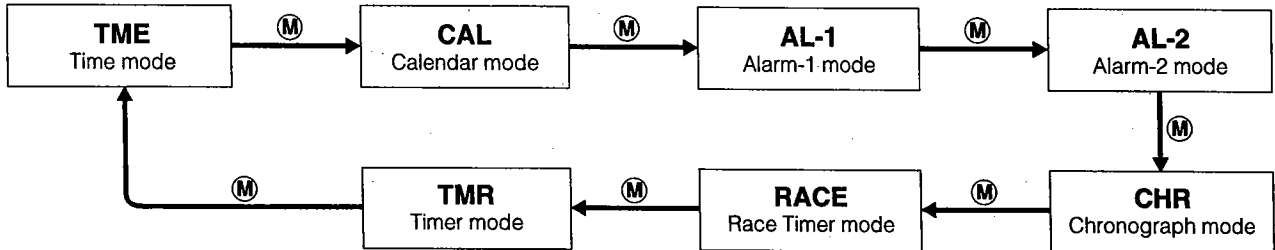
(3) Return the crown to its normal position.

> The analog time and digital time can be adjusted separately, so you can use this watch as a dual time watch.

§6. HANDLING OF DIGITAL DISPLAY SECTION (Cal. C440/C450)

A. Switching Modes

Cal. C440

In addition to Time display, Cal.C440 has 6 functions of Calendar, Alarm-1, Alarm-2, Chronograph, Race Timer and Timer, Mode of watch changes each time Ⓜ button is pressed. See Mode Indicator to check the present mode.

```
┌──────────┐   Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐
│   TME    │ ────> │     CAL      │ ────> │     AL-1     │ ────> │     AL-2     │
│Time mode │       │Calendar mode │       │ Alarm-1 mode │       │ Alarm-2 mode │
└──────────┘       └──────────────┘       └──────────────┘       └──────────────┘
     ▲                                                                   │ Ⓜ
     │ Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐ ▼
     └──── │     TMR      │ <──── │     RACE     │ <──── │     CHR      │
           │  Timer mode  │       │Race Timer mode│      │Chronograph mode│
           └──────────────┘       └──────────────┘       └──────────────┘
```
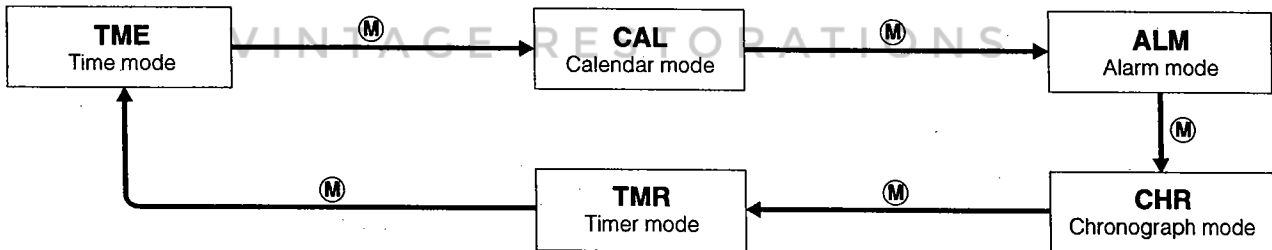
Auto-Return:

Display will return automatically to normal Time display mode if left in Alarm-1 or Alarm-2 mode for more than 2 minutes without any operation.

Cal. C450

In addition to Time display, Cal.C450 has 4 functions of Calendar, Alarm, Chronograph and Timer, Mode of watch changes each time Ⓜ button is pressed. See Mode Indicator to check the present mode.

```
┌──────────┐   Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐
│   TME    │ ────> │     CAL      │ ────> │     ALM      │
│Time mode │       │Calendar mode │       │  Alarm mode  │
└──────────┘       └──────────────┘       └──────────────┘
     ▲                                            │ Ⓜ
     │ Ⓜ   ┌──────────────┐   Ⓜ   ┌──────────────┐ ▼
     └──── │     TMR      │ <──── │     CHR      │
           │  Timer mode  │       │Chronograph mode│
           └──────────────┘       └──────────────┘
```
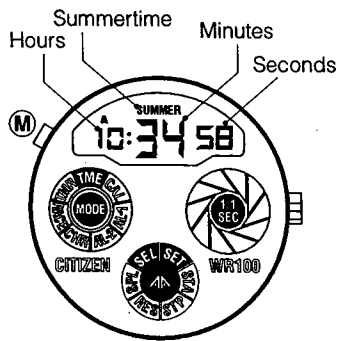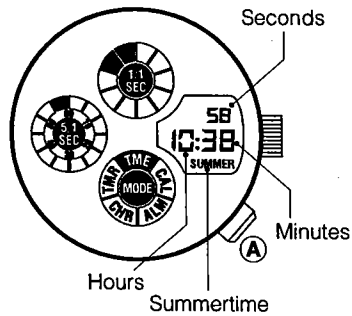
Auto-Return:

The watch will return automatically to normal Time mode if left in Alarm mode for more than 2 minutes without any operation.

B. Setting the Digital Time

<Cal. C440>

<Cal. C450>

To set for Summertime

1) Press Ⓑ button for more than 2 seconds in normal Time display mode. "SUMMER, ON/OFF" flashes.

2) Press Ⓐ button to set for summertime. Indicator changes to On or Off each time this button is pressed.

- "SUMMER" is on display when set to summertime. The watch shows the time one hour earlier than the regular time when it is set to summertime.

To adjust Seconds

1) Press Ⓑ button in adjustment mode ("SUMMER" is flashing). Seconds flashes.

2) Press Ⓐ button while Seconds are flashing. Digits returns to "00," and restarts.

To adjust Time display

1) Press Ⓑ button in adjustment mode (Seconds are flashing). Flashing digits change in order as shown in diagram each time button is pressed.

2) Press Ⓐ button to adjust flashing digits. Press and hold Ⓐ button for rapid advancement.
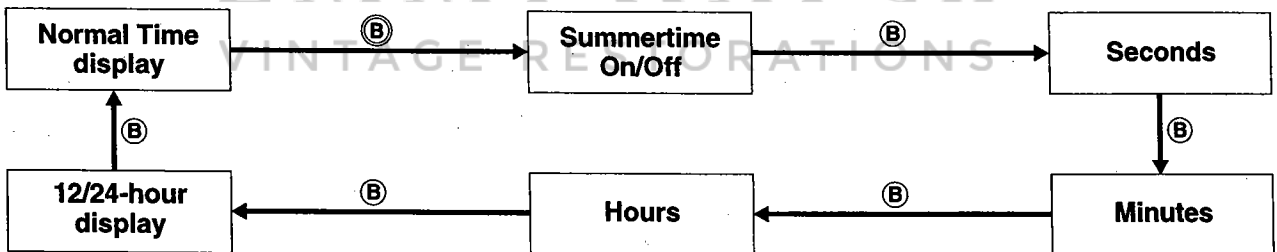
Button operation: Ⓑ Press for 2 seconds or longer, Ⓑ Press once

- Summertime On/Off is changed each time Ⓐ button is pressed.
- 12/24-hour display is changed each time Ⓐ button is pressed.
- Be sure to set AM/PM mark correctly when using 12-hour display system.
- Auto-return to normal Time display will activate when the watch is left in adjustment mode for more than 2 minutes.
- If Ⓜ button is pressed in adjustment mode, display will return directly to normal Time.

Linkage with Summertime:

Setting of Alarm 1&2 (Cal.C440) or Alarm (Cal.C450) does not change when Summertime is set in Time display mode.
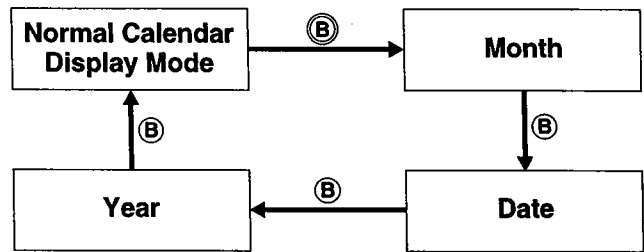
C. Setting the Calendar

• Calendar shows Month, Date and Day.

<Cal. C440>
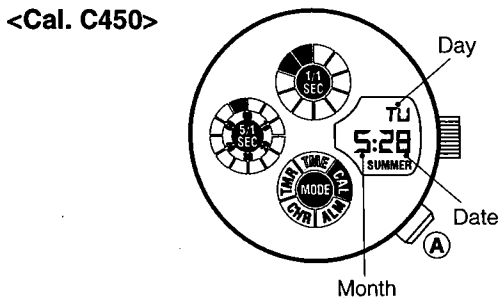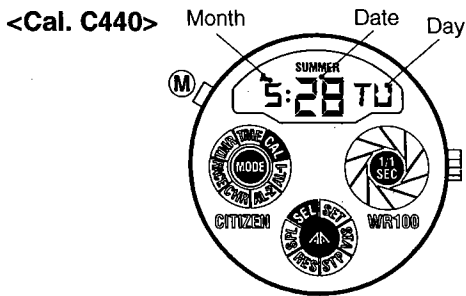
To set Calendar

1) Press Ⓑ button in Calendar mode for more than 2 seconds. Month flashes.

2) Flashing digits change in order as shown in the diagram each time Ⓑ button is pressed.

3) Press Ⓐ button to adjust flashing digits. Press and hold Ⓐ button for rapid advancement.

<Cal. C450>

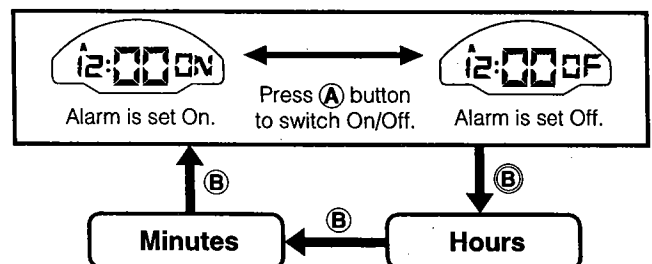| Normal Calendar Display Mode	→ Ⓑ	Month
↑ Ⓑ		↓ Ⓑ
Year	← Ⓑ	Date

• Year can be set from 1996 to 2099.
• Auto-return to normal Calendar display will activate when the watch is left in adjustment mode for more than 2 minutes.
• Day of the week is automatically set with adjustment of Month, Date and Year.
• When Calendar is set to a non-existent date (e.g., February 30), display will show automatically first day of next month when returned to normal mode.
• Month-end adjustments are not necessary as Calendar is programmed to be set automatically.
• If Ⓜ button is pressed in adjustment mode, display will return directly to normal Calendar display mode.

D. Setting the Alarm-1 (Cal. C440) / Alarm (Cal. C450)

<Cal. C440>
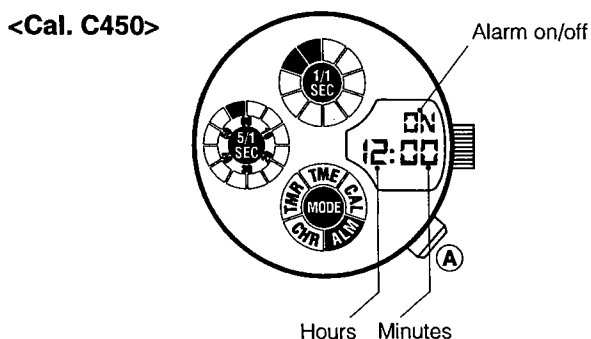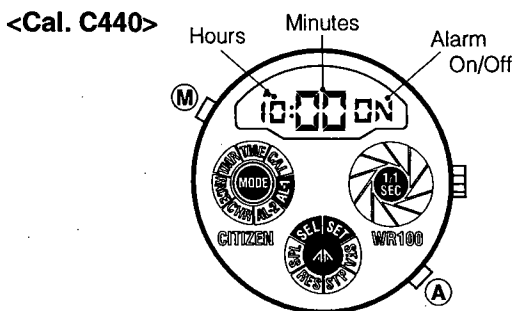
To set Alarm-1 (Cal. C440) / Alarm (Cal. C450)

1) Press Ⓑ button in Alarm mode for more than 2 seconds. Hours flash.

2) Press Ⓑ button as necessary to select digits to be adjusted. Press Ⓐ button to set Alarm.

• If Time display is set to 12-hour display system, it is linked to Alarm. Make sure that AM/PM is set correctly.

• Alarm setting does not change when Summertime is set in Time display mode.

<Cal. C450>

12:00 ON	← Press Ⓐ button to switch On/Off →	12:00 OF
Alarm is set On.		Alarm is set Off.
↑ Ⓑ		↓ Ⓑ
Minutes	← Ⓑ	Hours

To switch Alarm On/Off

• Press Ⓐ button in Alarm mode to switch Alarm On/Off.

Alarm Sound

• Alarm buzzer will sound for about 20 seconds. Press any button to stop Alarm sound.

Alarm Monitor

• Alarm will sound while Ⓐ button is pressed in Alarm mode.

Auto-Return

• Display will return automatically to normal Alarm display mode if left in Alarm adjustment mode for more than 2 minutes without any operation.
• Display will return automatically to Time display mode when 2 minutes have elapsed in normal Alarm display mode.

Instant Manual Return

• Press Ⓜ button in Alarm adjustment mode to return instantly to normal Alarm display.
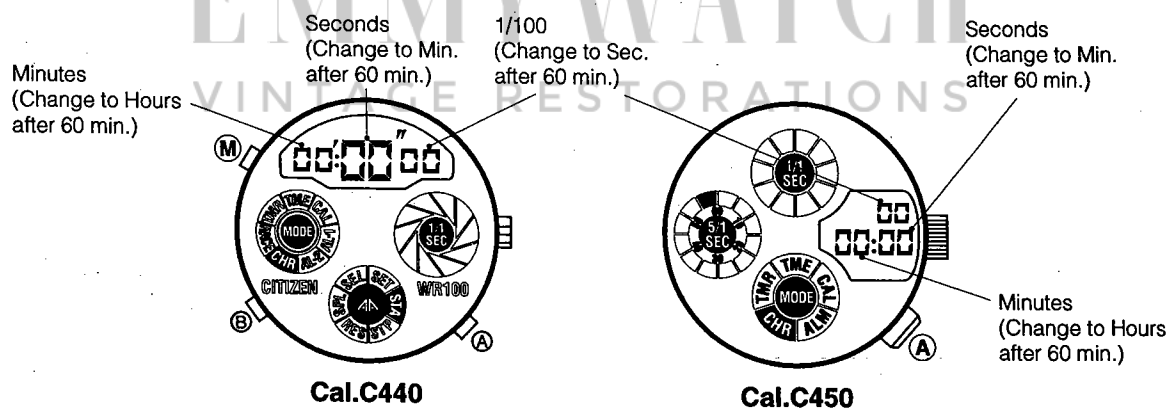

E. Setting the Alarm-2 (Cal. C440)

• Alarm-2 can be set and operated in same way as Alarm-1. Alarm-2 has a different sound.

F. Using the Chronograph

Chronograph measures up to 23 hours 59 minutes 59 seconds in 1/100 second. It will stop at next second when it reaches exactly 24 hours and reset to 00 minute 00 second 00. Chronograph also has Split Time measurement function.

<Reset Mode of Chronograph>

Minutes (Change to Hours after 60 min.)

Seconds (Change to Min. after 60 min.)

1/100 (Change to Sec. after 60 min.)

Seconds (Change to Min. after 60 min.)

Minutes (Change to Hours after 60 min.)

Cal.C440   Cal.C450

<Display of Time Measurement>

• Chronograph shows Minutes, Seconds and 1/100 Second up to 60 minutes and will change to Hours, Minutes and Seconds after 60 minutes.

To Measure Total Elapsed Time

1) Press Ⓐ button to start/stop Chronograph.

• Start/stop can be repeated for any number of times by pressing Ⓐ button.
• EL Light will turn ON for 4 seconds when counting is stopped by pressing Ⓐ button.

2) Press Ⓑ button when counting is stopped to reset Chronograph.

To Measure Split Time

1) Press Ⓐ button to start/stop Chronograph.

2) Press Ⓑ button while Chronograph is counting. Split Time will appear for 10 seconds.

- "SPL" will flash when Split Time is shown.
- EL Light will turn ON for 4 seconds when Ⓑ button is pressed.

3) Press Ⓑ button when counting is stopped to reset Chronograph.
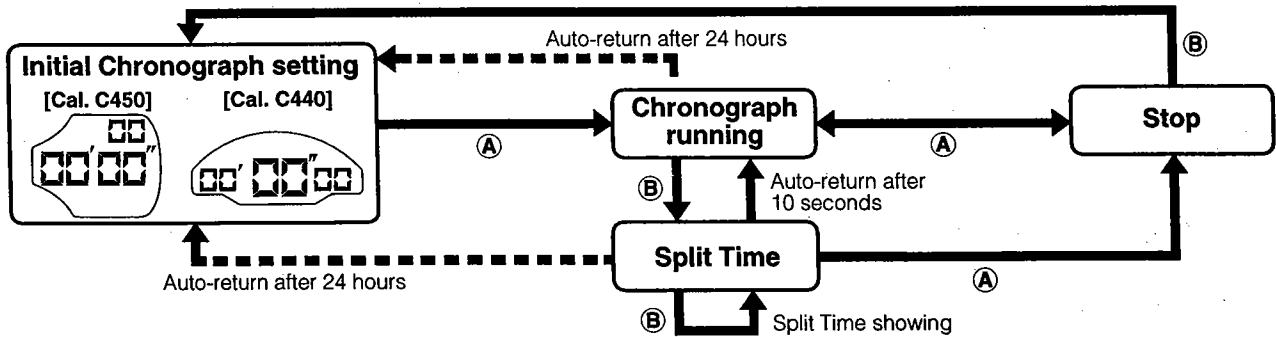
* If switched to another mode while Chronograph is running and then returned to Chronograph mode, the watch will show time measurement going on at time of mode switching. (If switched while Split Time is shown, the watch will return to Chronograph running mode.) However, if Chronograph counting has exceeded 24 hours, the watch will return to Chronograph reset mode.

G. Using the Race Timer (Cal. C440)

- Race Timer can be set to 15 different duration of countdown in 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, 6, 5, 3 and 1 minute. Use this function by setting to one of these countdown lengths as desires.
- When Race Timer countdown is finished, Time-Up signal will sound for 5 seconds and the watch will be automatically set to Chronograph mode (Auto-Chrono) and start counting from 00 hour 00 minute 00 second.

<Reset Mode of Race Timer>
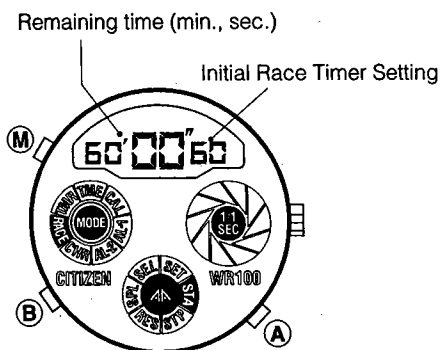
To Set Race Timer

Press Ⓑ button in Race Timer mode. Length of time countdown will change 15 times starting from 60 minutes to 1 minute. Set Race Timer to desired length. Press and hold Ⓑ button for rapid advancement.

To use Race Timer

1) Press Ⓐ button in Race Timer mode. Timer starts countdown from the time set.

2) Press Ⓐ button stop/start countdown.

3) Press Ⓑ button when countdown is stopped. Race Timer display returns to initial setting.

4) If Ⓑ button is pressed while countdown is continuing, Race Timer returns to initial setting and automatically restart coundown.

5) When Race Timer countdown is finished, Time-Up signal will sound for 5 seconds and the watch will be automatically set to Chronograph mode (Auto-Chrono) and start counting from 00 hour 00 minute 00 second.
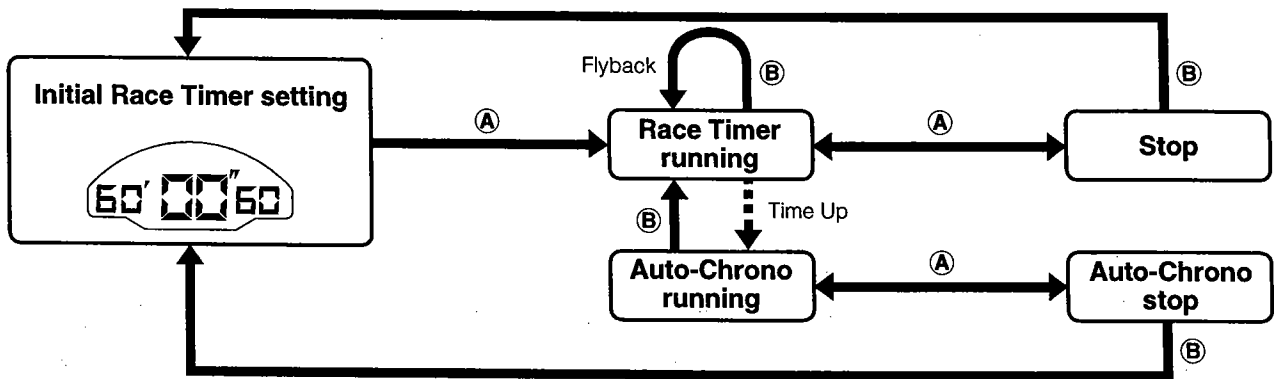
Initial Race Timer setting

60' 00"60

Flyback → **Race Timer running** ⓐ ←→ ⓐ **Stop** ⓑ

ⓐ (from Initial Race Timer setting to Race Timer running)

ⓑ ... Time Up ↓

Auto-Chrono running ⓐ ←→ ⓐ **Auto-Chrono stop** ⓑ

ⓑ (Race Timer running ↕ Auto-Chrono running)

- Buzzer will sound to mark remaining time at 10, 5, 3, 1 minute and 50, 40, 30, 20, 10, 5, 4, 3, 2, 1 second.
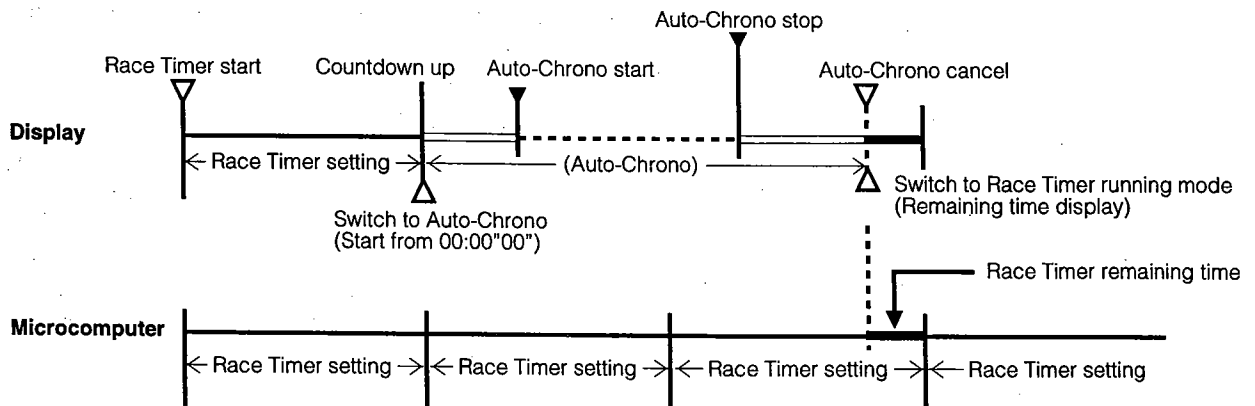
Auto-Chrono Measurement

- When Race Timer countdown is finished, Time-Up signal will sound and the watch will be automatically set to the Chronograph running mode (Auto-Chrono).
- Auto-Chrono will start counting from 00 hour 00 minute 00 second.

Using Auto-Chrono

1) To stop Auto-Chrono, press ⓐ button while Auto-Chrono is running. To restart Auto-Chrono, press ⓐ button while Auto-Chrono is stopped.

2) To switch to Race Timer running mode, press ⓑ button while Auto-Chrono is running.

Display after switching to Race Time/Auto-Chrono

* When Race Timer and Auto-Chrono are running, microcomputer in the watch keeps repeating Race-Timer countdown as shown in diagram. If switched to Race Timer from Auto-Chrono, the watch will show Race Timer countdown in progress. (Countdown of microcomputer does not stop even if Auto-Chrono is stopped.)

Display

Race Timer start — Countdown up — Auto-Chrono start — Auto-Chrono stop — Auto-Chrono cancel

← Race Timer setting → ← ——— (Auto-Chrono) ——— →

Switch to Auto-Chrono (Start from 00:00"00")

Switch to Race Timer running mode (Remaining time display)

Race Timer remaining time

Microcomputer

← Race Timer setting → ← Race Timer setting → ← Race Timer setting → ← Race Timer setting

3) To return to initial Race Timer setting, press ⓑ button in Auto-Chrono stop mode.

- The watch will return to Time display mode if ⓜ button is pressed in Race Timer or Auto-Chrono mode.
- If switched to another mode from initial Race Timer setting, Race Timer running, Race Timer stop, Auto-Chrono running or Auto-Chrono stop mode and then reset to Race Timer, function will return to the mode set at the time of switching. However, if Auto-Chrono counting has exceeded 24 hours, the watch will return to initial Race Timer setting mode.

H. Using the Timer

• Timer can be set up to 60 minutes in unit of one minute. Buzzer will sound for 5 seconds when countdown is up and display will return to initial set time.

<Initial Timer Setting>

<Cal. C440>   Remaining time setting (Min. Sec.)   Timer set time
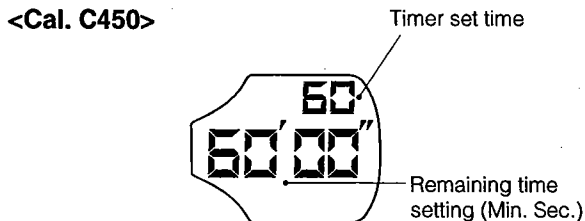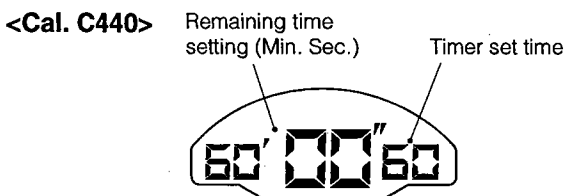
To Set Timer

Press Ⓑ button in Timer mode when set time is flashing. Set time digits decrease in units of one minute. Press and hold Ⓑ button for the rapid change of digits.

<Cal. C450>   Timer set time

Remaining time setting (Min. Sec.)

To Use Timer

1) Press Ⓐ button. Timer starts countdown from set time.

Initial Timer setting
[Cal. C450]   [Cal. C440]

Ⓐ → Timer running ← Ⓐ → Stop   Ⓑ

Time-up

Timer countdown finished

Auto-return in 5 seconds after Timer countdown finished
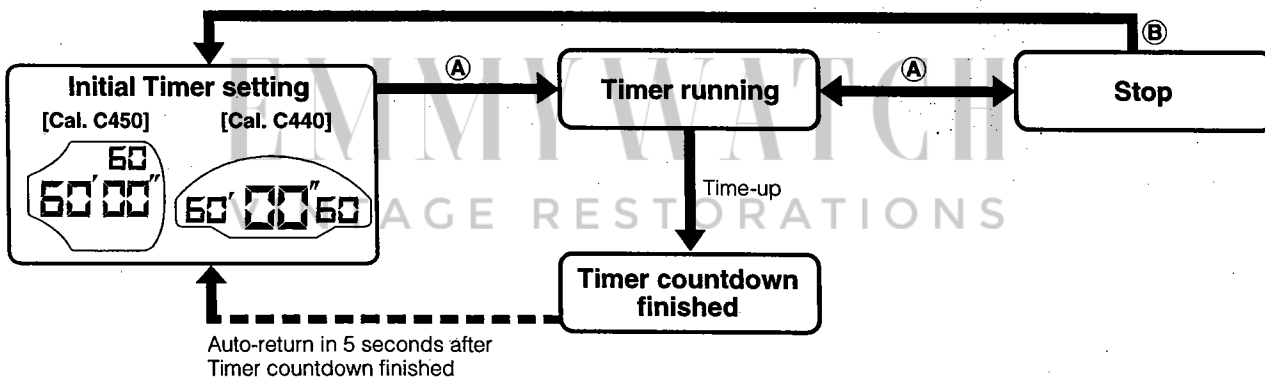
2) Press Ⓐ button to stop/restart Timer. EL Light turns On when Ⓑ button is pressed while Timer is running.

3) Press Ⓑ button when Timer is stopped to return to initial set time.

• If switched to another mode from initial Timer setting, Timer running or Timer stop mode and then reset to Timer, function will return to the mode set at the time of switching. However, if Timer countdown is finished, the watch will return to initial Timer setting.

§7. HANDLING OF DIGITAL DISPLAY SECTION (CAL. C460)

A. Switching Modes (Functions)

In addition to the time mode, this watch has six other modes (functions): calendar, Alarm 1, Alarm 2, Chronograph, Timer, and Zone Setting. Each press of the Ⓜ button switches the mode in the following sequence.
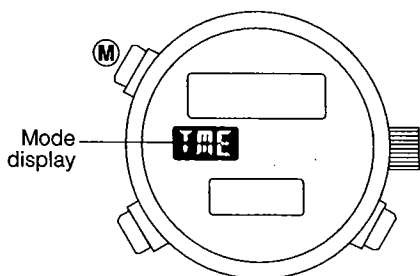
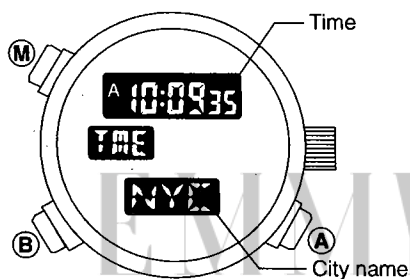| Display	Mode
TME	Time
CAL	Calendar
AL1	Alarm 1
AL2	Alarm 2
CHR	Chronograph
TMR	Timer
SET	Zone Setting

* If the watch is left in the Alarm 1, Alarm 2, or Zone Setting mode for approximately 2 minutes, it automatically returns to the time mode <TME>.

B. Displaying the Time and Calendar of Cities Worldwide

(1) Press the Ⓜ button to select the <TME> mode or <CAL> mode.

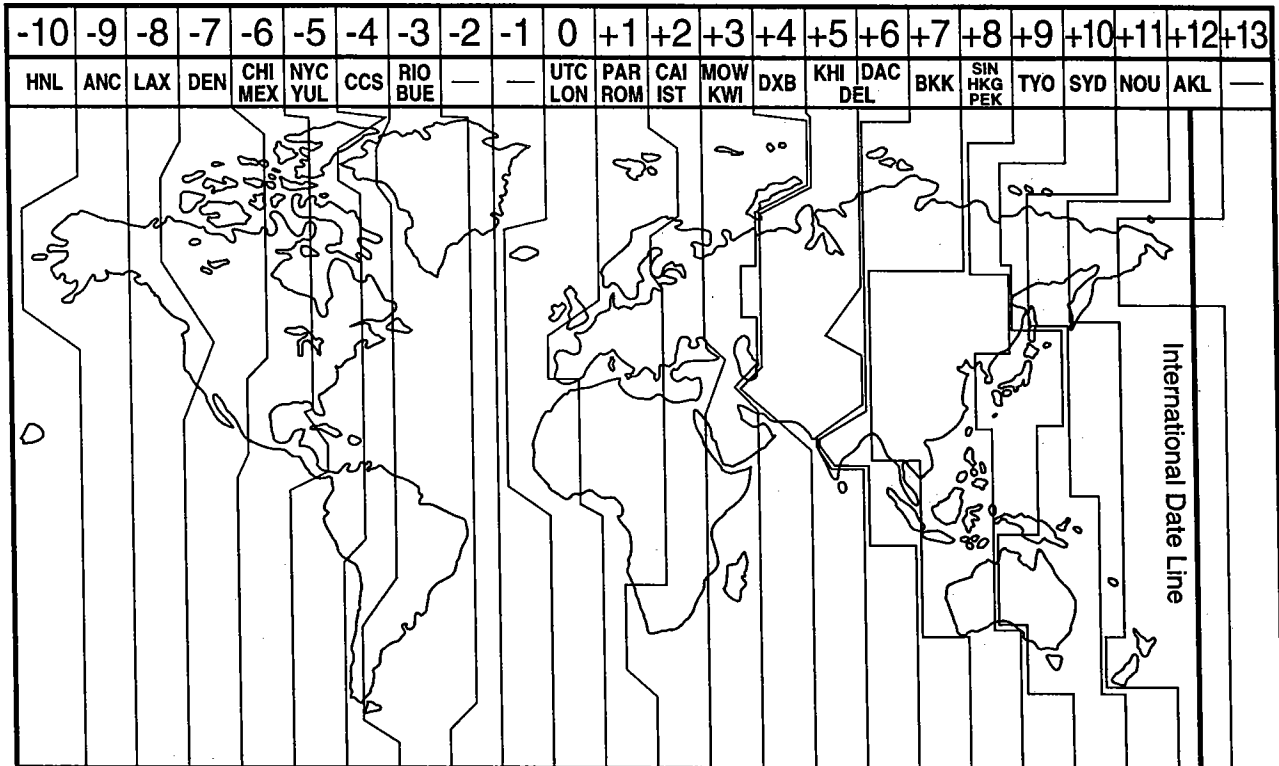(2) Each time the Ⓑ button is pressed, a city's name and its time (calendar) are displayed sequentially.
Cities can be displayed in the order No. 2 → 3 ... 31 → 1 → 2 (e.g., LON → PAR ... BUE → UTC → LON), as shown in the table, or in the opposite order, i.e., No. 2 → 1 → 31 ... 3 → 2 (e.g., LON → UTC → BUE ... PAR → LON).
To switch to the opposite display sequence, press the Ⓐ button and the Ⓑ button simultaneously.

The Time Difference Between the Cities and UTC Time

NO.	Indication	City	Time differ-ence	Summer time	NO.	Indication	City	Time differ-ence	Summer time
1	UTC	Universal time coordinated	±0	—	17	TYO	Tokyo	+9	×
2	LON	London	±0	○	18	SYD	Sydney	+10	○
3	PAR	Paris	+1	○	19	NOU	Noumea	+11	×
4	ROM	Rome	+1	○	20	AKL	Auckland	+12	○
5	CAI	Cairo	+2	○	21	HNL	Honolulu	−10	×
6	IST	Istanbul	+2	○	22	ANC	Anchorage	−9	○
7	MOW	Moscow	+3	○	23	LAX	Los Angeles	−8	○
8	KWI	Kuwait	+3	×	24	DEN	Denver	−7	○
9	DXB	Dubai	+4	×	25	CHI	Chicago	−6	○
10	KHI	Karachi	+5	×	26	MEX	Mexico City	−6	×
11	DEL	New Delhi	+5.5	×	27	NYC	New York	−5	○
12	DAC	Dacca	+6	×	28	YUL	Montreal	−5	○
13	BKK	Bangkok	+7	×	29	CCS	Caracas	−4	×
14	SIN	Singapore	+8	×	30	RIO	Rio de Janeiro	−3	○
15	HKG	Hong Kong	+8	×	31	BUE	Buenos Aires	−3	×
16	PEK	Beijing	+8	×					

As of 1997

| -10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
HNL	ANC	LAX	DEN	CHI MEX	NYC YUL	CCS	RIO BUE	—	—	UTC LON	PAR ROM	CAI IST	MOW KWI	DXB	KHI	DAC DEL	BKK	SIN HKG PEK	TYO	SYD	NOU	AKL	—

International Date Line

* Cities (regions) with summertime are indicated by the O symbol, and cities (regions) with no summertime system are indicted by the X symbol.
* Please note that time difference and summertime for cities are subject to change.

C. Setting the Digital Time <TME>

When the time is set for one of the 30 cities and UTC (Universal time coordinated) time, the time is automatically set for the cities.

<Normal time display>
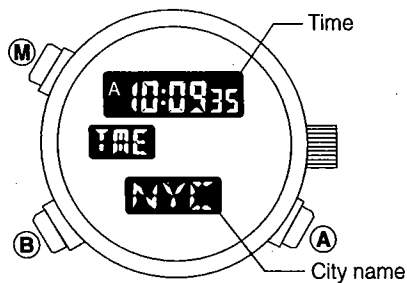
Time
City name

What is summertime?
Summertime or "daylight saving time: DST" has been inaugurated in many countries in order to efficiently utilize daylight by advancing the clock a certain amount of time, in relation to the normal time, during the summer. (This watch advances the time by 1 hour.)
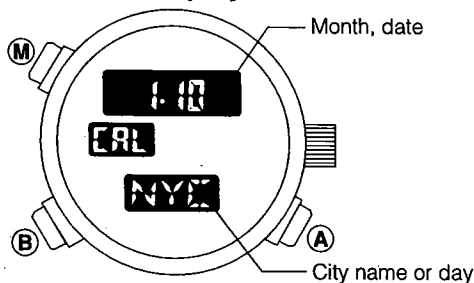
---

(1) Press the Ⓜ button to select the <TME> mode.

(2) Press the Ⓑ button to display the city whose time you want to adjust.

(3) Press and hold the Ⓑ button for 2 seconds or more. "S.T. (summertime abbreviation.)" and "ON" or "OF" flashes. Press the Ⓐ button to select summertime (ON) or (OF) for the city.

(4) Each time the Ⓑ button is pressed, the flashing figures change in this sequence [Summertime → Seconds → Minutes → Hour → 12 hours/24 hours] sequence. Make the figures that you want to adjust, flash.

(5) Press the Ⓐ button to adjust. (The flashing figures can be adjusted.)

(6) Press the Ⓜ button to return to the normal time display.

- When running in the 12-hour system, pay attention to the morning (A) and afternoon (P) indicators.
- The set mode (flashing display) will automatically revert to the normal display if left for two minutes with no input.
- Summertime can be set for any city. The Summertime setting is interlocked with all modes so that the <AL1>, <AL2> and <SET> modes of a city for which Summertime is selected, will also indicate the time according to the Summertime.

D. Using the Calendar <CAL>

Adjusting the calendar for one of the 30 cities and UTC time will automatically adjust the calendar for the remaining cities.

<Normal calendar display>

Month, date

City name or day

<Adjusting the Calendar>

(1) Press the Ⓜ button to move to the <CAL> mode.

(2) Press the Ⓑ button to display the city whose calendar you want to adjust.

(3) Press and hold the Ⓑ button for 2 seconds or more, the "month" starts flashing.
Press the Ⓐ button to adjust the "month".
(The flashing figures can be adjusted.)

(4) Each time the Ⓑ button is pressed, the flashing figures change in this sequence [Month → Day → Year] sequence. Make the item that you want to adjust, flash.

(5) Press the Ⓐ button covers adjust. (If the Ⓐ button is kept pressed, the setting changes quickly.)

(6) Press the Ⓜ button to return to the normal calendar display.

- The calendar covers the years 1995 thru 2099.
- The automatic calendar eliminates any need to adjust the watch at the end of the month or for leap years.
- The day is automatically adjusted when the month, date and year are adjusted.
- The calendar adjustment mode (flashing display) will automatically return to the normal display if left for about two minutes with no input.
- If a nonexisting date (e.g., February 30) is set, the date will automatically reset to the first of the next month once display returns to normal.

<Changing the Display>

[City name]   [Day]
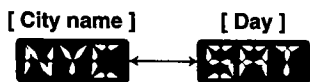
Press the Ⓐ button for more than 2 seconds to switch between city display and day display.

E. Using the Alarm <AL-1/AL-2>

Setting and operation of the Alarm 1 and Alarm 2 are the same, only the sound of the alarm is different.
Once you turn the alarm on, it will sound for 20 seconds at the same time each day.

<Normal alarm display>

Alarm set time

City name

<Setting the Alarm>
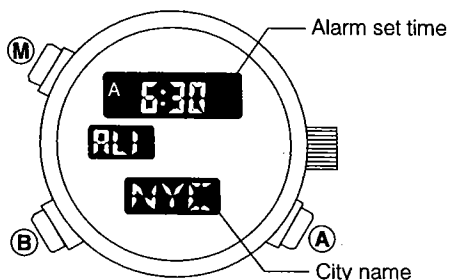
(1) Press the Ⓜ button to select the <AL1> or <AL2> mode.

(2) Press the Ⓑ button to display the time of the city for which you want to set the alarm.

(3) Press and hold the Ⓑ button for 2 seconds or more, the "hour" display will start flashing. The flashing item can be adjusted. Press the Ⓐ button to adjust the "hour". (If the Ⓐ button is kept pressed, the setting changes quickly.).

(4) Press the Ⓑ button while the "hour" is flashing to make the "minute" display flash instead. Press the Ⓐ button to adjust.

(5) Press the Ⓜ button to return to the normal alarm display.

• While in the alarm mode you can sound the alarm continuously for as long as you keep the Ⓐ button pressed. (Alarm sound monitor function)
• When you are using the 12-hour system, the alarm time will also run according to the 12-hour system. Watch the AM/PM indicator to confirm that you have made the setting you want.
• The alarm mode will automatically return to the normal display if left for about two minutes with no input.

<Switching the Alarm Function On and Off>

[ON]   Ⓐ   **[OFF]**

A 6:30 ⟷ OFF

Press the Ⓐ button while in the alarm mode to switch the alarm between on and off.

<How to Stop the Alarm Sound>

Press any button to stop the alarm while sounding.

F. Using the Chronograph <CHR>

This chronograph measures times of up to 23 hours 59 minutes 59 seconds and 99/100 seconds in units of 1/100 second. On reaching 24 hours of elapsed time, it resets to zero (0:00'00") and stops. It can also measure split times (intermediate elapsed times).

<Chronograph reset display>

— Measured time (minutes, seconds, 1/100 seconds)

— Measured time (hour)
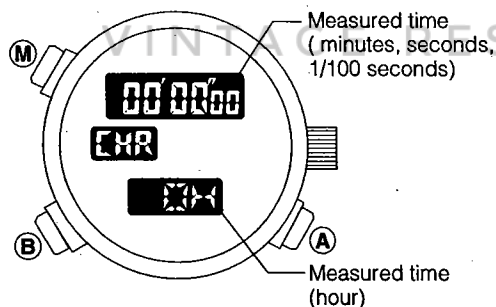
* About the confirmation sound
A confirmation sound will be heard when the chronograph is started, stopped, and at the time of split and reset operations.

<Accumulative Time Measurement>

(1) Each time the Ⓐ button is pressed, the chronograph is switched between start and stop.

(2) Press the Ⓑ button to reset while the chronograph is stopped.

<Split Time Measurement>

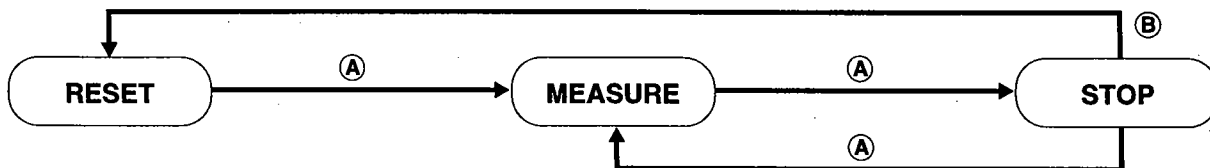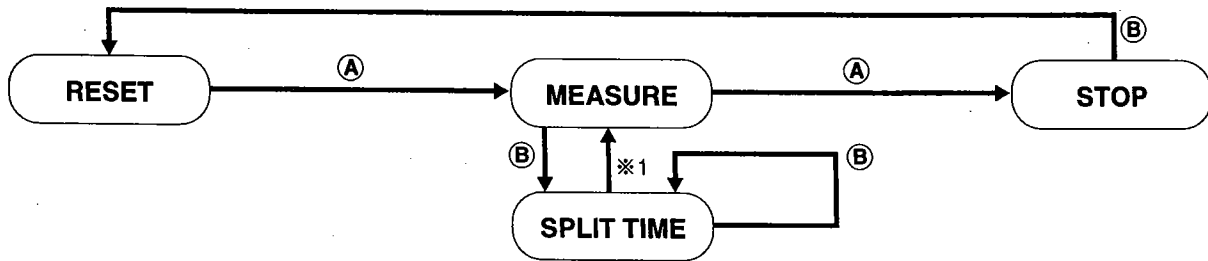(1) Each time the Ⓐ button is pressed, the chronograph is switched between start and stop.

(2) Press the Ⓑ button while the chronograph is measuring to display the split time for about ten seconds. (The "SPL" indicator will flash while the split time is displayed.) Each time the Ⓑ button is pressed, the newest split time is displayed.

(3) Press the Ⓑ button to reset while the chronograph is stopped.

```
         ┌─────────────────────────────────────────────────────────────────────┐
         │                                                                    Ⓑ │
         ▼                      Ⓐ                      Ⓐ                        │
   ┌──────────┐          ┌──────────────┐          ┌──────────┐
   │  RESET   │ ───────▶ │   MEASURE    │ ───────▶ │   STOP   │
   └──────────┘          └──────────────┘          └──────────┘
                          Ⓑ │   ▲ ※1    ┌──── Ⓑ
                             ▼   │        ▼
                          ┌──────────────┐
                          │  SPLIT TIME  │
                          └──────────────┘
```

※1: After 10 seconds, automatically returns to the measuring display.

<Switching the Mode During Chronograph Measuring>

Even if the Ⓜ button is pressed and the mode is switched while the chronograph is measuring, the measurement will continue. When you return to the <CHR> mode, the measured time is again displayed.
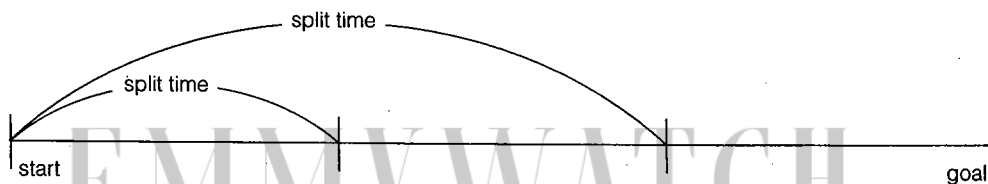
What is split time: Intermediate elapsed times from the start.

G. Using the Timer <TMR>

You can set the timer for a number of whole minutes up to 99 in one minute increments. At "time up" (when the set time has elapsed), the time-up alarm sounds for five seconds and the watch returns to the timer set time.

<Timer set display>

Remaining time (minutes, seconds)

Set time (minutes)

<How to Set the Timer>
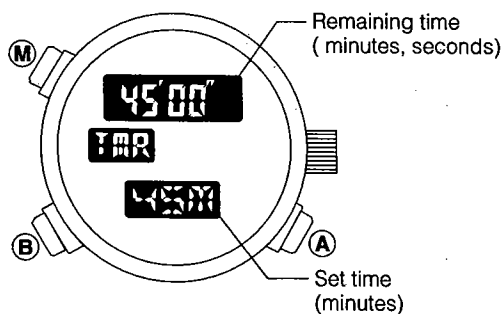
(1) Press the Ⓜ button to move to the <TMR> mode.

(2) Each time you press the Ⓑ button, the set time will increase by one minute. (If the Ⓑ button is kept pressed, the setting changes quickly.)

<How to Use the Timer>

(1) Each time the Ⓐ button is pressed, the timer is switched between start and stop.

(2) Press the Ⓑ button to reverts to set time while the timer is stopped.
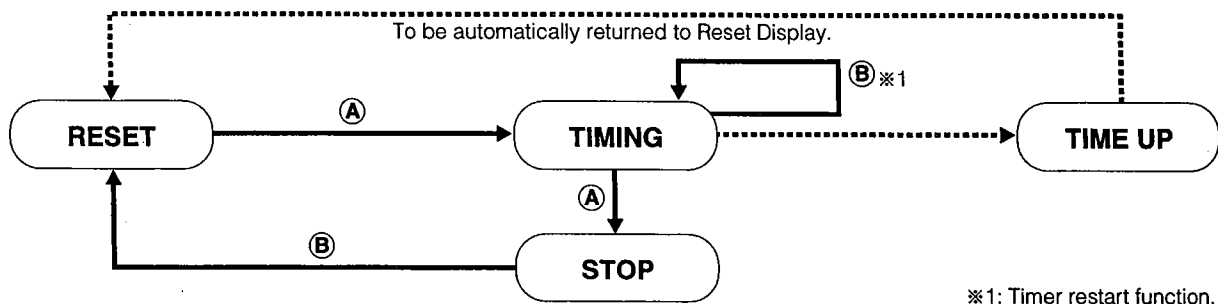
If you press the Ⓑ button while the timer is running, the time is reset to the set time and the timer is automatically restarted. (Timer restart function)

* About the confirmation sound

While in the timer mode, a confirmation sound will be heard when the timer is started, stopped, and restart operations.

<Switching the Mode During Timer Running>

Even if the Ⓜ button is pressed and the mode is changed while the timer is running, the timer countdown will continue. When you return to the <TMR> mode, the countdown time is again displayed.
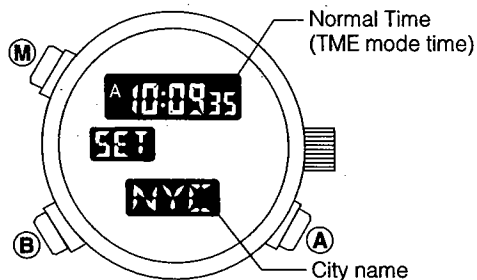
H. Using the Zone Setting <SET>

In the zone setting mode, you can select the cities that you want to display from among the 30 cities and UTC time that this watch is capable of displaying, and you can set Summertime for each of these cities.
This allows you to easily recall and display only the cities that have been set (to ON) in any mode.

<Normal zone setting display>

<How to Zone Setting>

(1) Press the Ⓜ button to move to the <SET> mode.

(2) Press the Ⓑ button to recall the city that you want to set.

(3) When the Ⓑ button is pressed for more than 2 seconds, the "ON" or "OFF" and the "city name" will flash.
Press the Ⓐ button to select whether the city should be displayed (ON) or not (OFF).

(4) When the Ⓑ button is pressed while the "city name" and "ON", or "OFF", are flashing, the "S.T. (Summertime symbol)" and "ON", or "OFF", will start flashing. Press the Ⓐ button to select whether Summertime should be set (ON) or canceled (OFF).

• To set other cities, press the Ⓑ button again to move to the adjustment mode for the next city. Follow the same procedure in sequence to set each of the desired cities.

(5) When all the desired cities have been set, press the Ⓜ button again to return to the normal zone setting display.

• The zone setting adjustment mode (flashing display) will automatically return to the normal display if left for more than two minutes with no input.

§8. WHEN THESE PROBREMS OCCUR ...

<The Watch Shows Abnormal Display>

When the battery life is close to expiring, the display or functions may become abnormal. When these problems occur, replace the battery as soon as possible.
In rare cases, a strong impact, etc. may cause the display or functions to bacome abnormal (no display, alarm sounds incessantly, etc.) In this case, perform the all-reset operation by referring to "§9. ALL-RESET OPERATION".

<Following Battery Replacement>

After the battery has been replaced, perform the all-reset operation by referring to "§9. ALL-RESET OPERATION".

§9. ALL-RESET OPERATION

(1) Pull the crown out.

(2) Press the three buttons Ⓐ, Ⓑ and Ⓜ simultaneously. (While pressed, there will be no display.)

(3) Release the buttons. (All the display segments will appear.)

(4) Push the crown in. (At this point, a monitor sound is heard.)

This completes the all-reset operation. Set each mode correctly before using the watch.

§10. DISASSEMBLY AND ASSEMBLY OF MOVEMENT

Disassemble the parts in order of ① → ㉙
Assemble the part in order of ㉙ → ①

※This diagram is common to CAL. C400, C401, C410, C420, C430, C440, C450 and C460.

● Lubrication mark

| Ⓐ▷ : A-Lube oil |
| Ⓥ▶ : V-Lube oil |
| Ⓕ▷ : F-Lube oil |
| ○○○▷ : CH-1 oil |

Battery 280 ①

Buzzer contact spring 903 ⑫

⑨ 720 Circuit unit supporter (T x1)

⑩ 279 Unit of electronic circuit (T x1)

⑪ 902 E.L. panel connection spring

⑬ 231 Battery connector spring

⑭ 226 LC display panel supporter

Fourth wheel and 023 ⑱ pinion

Third wheel and pinion 017 ⑳

Resetting lever 292 ㉒

Coil unit 246 ⑯ (T x1)

Rotor 285 ㉕

Stator 190 ㉘

Plate complete 750 ㉙

Hour wheel 075 ⑧

⑰ 701 Train wheel bridge (T x1)

⑲ 084 Fifth wheel and pinion

㉑ 079 Setting stem holder complete

⑮ 065 Setting stem

㉓ 064 Clutch wheel

㉔ 711 Center wheel cook

㉖ 028 Cannon pinion with driving wheel

㉗ 072 Minute wheel and pinion

⑦ 078 dial washer

Hour wheel guard 176 ⑥ (T x2)

E.L. Panel 211 ③

LC display panel 281 ④

LC display panel 268 ⑤ connection rubber x2

LC display panel 226 ② supporter

CALIBER NO.

● Use the movement holder Cal. C21
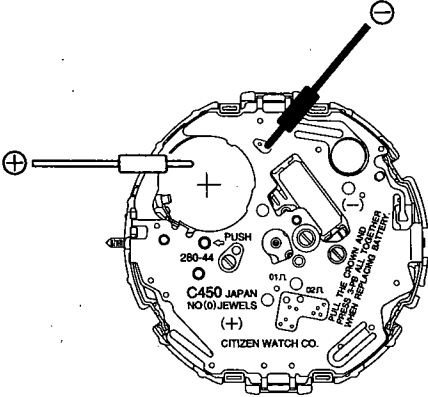
● The shapes of some parts may be different from the above illustration
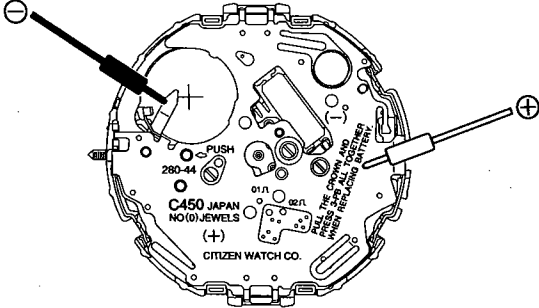
§11. TROUBLESHOOTING AND ADJUSTMENT

No display watch stop → **1** Measurement of battery voltage

— O.K. → Replacement of unit of electronic circuit

— Low voltage → Replacement of battery →
- No digital display analog stop
- Defective digital display/Normal analog working → **3** Check of LC display panel connection parts
- Normal digital display analog stop → **2** Check of output signals
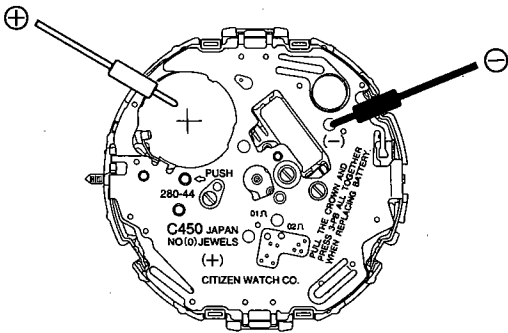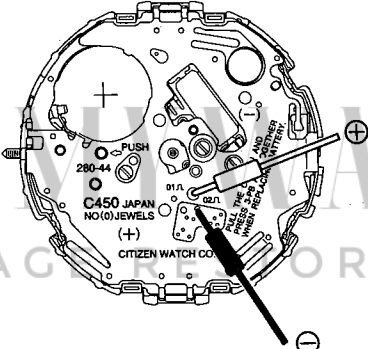- Normal display/ working

3 Check of LC display panel connection parts — O.K. → Replacement of unit of electronic circuit or LC display panel

— No good → Correction or replacement

2 Check of output signals — No good → Replacement of unit of electronic circuit

— O.K. → **4** Check of connection part → **5** Measurement of coil resistance — No good → Replacement of coil

5 — O.K. → **6** Check of train wheel → **7** Check of dial side mechanism → Replacement of defective parts

Wrong time rate → **8** Measurement of time rate
— O.K. → **9** Confirmation of using condition — Low voltage → Replacement of battery
— No good → **1** Measurement of battery voltage — O.K. → **8** Measurement of time rate → Replacement of unit of electronic circuit

Defects in operation (Incomplete switch of displays, etc.) → **10** Check of switch mechanism
— O.K. → Replacement of unit of electronic circuit
— No good → Correction

Defective alarm → **11** Check of alarm mechanism
— O.K. → Replacement of unit of electronic circuit
— No good → Correction — O.K. → Replacement of EL panel

Defective EL → **1** Measurement of battery voltage → **12** Check of EL panel connection
— No good → Correction

1 Measurement of battery voltage → **13** Measurement of current consumption → **8** Measurement of time rate → **14** Check of appearance and functions → Completion

Check Points	How to Check	Results and Treatments
❶ Measurement of baterry voltage	[Refer to Technical Manual, Basic Course II-1-a] <Tester range: DC 3V> 	• **Over 1.5 V** → Normal • **Under 1.5 V** → Replace the baterry.
❷ Check of output signals.	[Refer to Technical Manual, Basic Course II-1-b] <Tester range: DC 0.3V> (The tester lead pins have no polarity.)	• The tester pointer swings every 1 second. → Normal • The tester pointer does not swing. → Check the connections parts. ↓ • The connections are normal. → Replace the unit of electronic circuit.
❸ Check of LC display panel and connection parts	[Refer to the Digital Section of Technical Manual, Basic Course II-2-a] • Inspection of all segments Pull out the crown and push the three buttons at the same time to turn on all the segments, and check for defective ones. (Refer to §9. ALL RESET OPERATION) • Continuity test on LC display panel, cell connection rubber and plate . Check the parts for stain, breakage, etc.	• LC display panel, connection rubber or metal plate is not installed correctly. → Install correctly. • Parts are stained or dirty. → Remove stain and dirt. • Parts are cut broken or scratched. → Replace parts.
❹ Check of connection part	[Refer to Analog Section of Technical Manual, Basic Course II-2-a]	

Check Points	How to Check	Results and Treatments

❺ Measurement of coil resistance	[Refer to Technical Manual, Basic Course II-1-c]
	
	• Remove the unit of electronic circuit, then measure the resistance of coil.
	
	• The tester lead pins have no polarity.
	
	 <Tester range: R x 10Ω>
		• **1.9 kΩ ~ 2.3 kΩ**
		  → Nomal
		
		• Outside range of **1.9 kΩ ~ 2.3 kΩ**
		  → Replace coil unit.

❻ Check of train wheel	[Refer to Technical Manual, Basic Course II-2-b] • Check clearance of each wheel. Check rotor for dust and oil.	
❼ Check of dial-side mechanism	[Refer to Technical Manual, Basic Course II-2-c] • Confirm all parts are not deformed and are lubricated properly.	
❽ Measurement of time rate	[Refer to Technical Manual, Basic Course II-2-d] • Since this watch uses the D.F.C. (digital frequency control) method and has no control terminal, there is no way of adjusting its time rate in the field. (Measurement is made in a 10-second range.)	The watch loses or gains a substantial amount of time. → Replace the unit of electronic circuit.
❾ Confirmation of using condition	[Refer to Technical Manual, Basic Course II-2-e]	

❿ Check of switch mechanism	1. Inspection of movement.
	
	  • Press the switch spring of circuit unit supporter with tweezers, etc. to contact it to plate complete, and confirm the switching function.
	  • Check for removal of pattern of electronic circuit unit, deformation of switch return spring, etc.
	
	2. Inspection of push button
	  • Check push button for deformation, stain, etc.
	
	(Note)
	Be sure to apply silicone oil to the packing of push button for waterproofness and smooth operation.
		• Switching function is normal.
		  → Inspect push button.
		
		• Pattern is removed or deformed.
		  → Replace defective parts.
		
		• Push button is stained or deformed.
		  → Remove stain, or replace push button.

Check Points	How to Check	Results and Treatments

⑪ Check of alarm mechanism	[Refer to Technical Manual, Basic Course II-1-d]
	
	*1. Set the movement in the case, and check output of alarm signal with the case back removed.
	
	  (1) Set the watch in alarm mode.
	
	  (2) Apply ⊕ lead pin to battery surface and ⊖ lead pin to pattern of buzzer contact spring, them press Ⓐ button.
	
	                                                    <Tester range: DC 0.3V>
	
	*2. If the output of alarm is normal, perform the following inspection.
	  • Check the piezo-electric element of vibrating plate for cracks and breakage.
	  • Check the buzzer contact spring for bend and deformation.
	  • Check the pattern of electronic circuit unit for dust and stain.
		• Tester pointer does not swing.
		  → Replace the electronic circuit unit.
		      ⬇
		• Tester pointer swings.
		  → Normal
		      ⬇
		• Perform inspection in *2.
		      ⬇
		Normal indication.
		  → O.K.

⑫ Check of EL panel connection	1. Confirmation of battery voltage
	
	2. Check of EL panel connection
	
	  • Check the EL panel for breakage. Particularly check the electrode pattern on the back side for stain, breakage, etc. which can lower electrical continuity.
	
	  • Confirm that the EL connection spring is in contact with the EL panel and electrode pattern normally.
	
	If any cause is not found by inspections 1 and 2, the EL panel must have been deteriorated. Replace the EL panel.
		• **Over 1.5 V**
		  → Check EL panel connection.
		
		• **Under 1.5 V**
		  → Replace battery.
		
		• **Trouble of EL panel**
		  → Replace EL panel.
		
		• **Deformation of EL connection spring**
		  → Repair or replace.

Check Points	How to Check	Results and Treatments
⓭ Measurement of current consumption	[Refer to Technical Manual, Basic Course II-1-f] (1) Set the battery to tester. (2) Set the lead bars of the tester to the module. Pull the crown and push the three buttons at the same time, them push the crown (The all-reset operation procedure). Then, measure the current consumption. <Use the tester range: DC 10µA> ★ Precautions for measurment 1. Be sure to measure according to the above procedure. If measurement is not performed according to the above procedure, the watch may indicate and operate abnormally and the current power consumption cannot be measured correctly. 2. When the lead bars are applied to the measurement parts, the meter reading may exceeds the maximum value. In this case, wait for about 30 seconds, then measure again. ┌ **Influence of light** ─────────┐ **Avoid taking measurements under an incandescent lamp or direct sunshine, because this may cause the current value to increase.** **The light of a fluorescent lamp has no influence on current consumption.** └─────────────────────┘	• Current consumption of the movement **Under 3.0 µA.** → Nomal **Over 3.0 µA.** → Inspect train wheel and dial side mechanism, and remove dust and stain and oil. • Pull the crown to measure the current consumption under the reset state. **Under 2.4 µA.** → Nomal **Over 2.4 µA.** → Electronic circuit unit is defective. ⬇ Replace the electronic circuit unit.
⓮ Check of appearance and functions	[Refer to Technical Manual, Basic Course II-2-f] • Check inside of case for dust and stain. • Check operation of setting switches for normality. • Check segment for normality (See ❸ Check of LC display panel and connection part.) * Be sure to apply silicone oil to packing of each push button. It is necessary for water resistance and smooth operation.	