TECHNICAL INFORMATION

CITIZEN QUARTZ

Cal. No. C140

CITIZEN

REFERENCE

• Barometric Pressure Measurement

The barometric pressure displayed on the watch is the barometric pressure of the present location, as measured by the sensor in the watch. The barometric pressure displayed, changes with any change in altitude.
(Use the watch's measurement function to observe barometric pressure change's, in a fixed locale.)

• Barometric pressure display

This watch's barometric pressure measurements are based on the standard atmospheric pressure, and the quantity of change is indicated. However, since the atmospheric pressure indicated by this watch is always relative to the standard atmospheric pressure at 0 m above sea, 1013.25 mbar and 15°C, use it as a reference value.

• One standard atmosphere:

1013.25 mbars at an altitude of 0 m and a temperature of 15°C (as specified by the International Civil Aviation Organization (ICAO)).

Altitude	Atmospheric pressure
0 m	1013.25 mbars
1,000 m	898.7 mbars
2,000 m	795.0 mbars
3,000 m	701.1 mbars
4,000 m	616.4 mbars

The atmospheric pressure decreases by approximately 1 mbar when the altitude increases by 10 m.

When you observe changes in the atmospheric pressure, perform measurements in the same place.

Contents

[1] OUT LINE AND MAIN FEATURES

1. This is multi-functional quartz watch with a built-in electronic barometric pressur sensor for sailing and ocean cruising and offers the following features:

- **Barometric pressure measurement**
  - Measurement range: 800 to 1,050 mbars
  - Includes barometric data correction function.
- **Ship's local time function**
  - The time zone can be adjusted in units of 30 minutes.
- **Local time function**
  - When travelling to a different time zone, you can set the local time in addition to your home time and use the watch with dual time.
  - The time zone can be adjusted in units of 30 minutes.
- **Alarm function**
  - Alarm can be set to the Time/calendar, Ship's local or Local time mode.
  - The alarm will sound at the designated time in the specified mode.

2. This watch is water-resistant and designed for use in rugged environment.

- **Water-resistance:** 10 bars

2 SPECIFICATIONS

Caliber No.	C140
Type	Multi-functional combination quartz watch with barometer
Accuracy	±20 seconds per month at normal temperatures.
Quartz oscillation frequency	32,768 Hz
Display specifications: Analog: Digital:	 Three hands (Hour, Minute, Second) LCD
Operating temperature range	0 to 55°C (32 to 131°F)
Barometric pressure measurement range	800 to 1050 mbars (by units of 1 mbar)
Barometric pressure measurement accuracy	±4 mbars (24°C)
Effective temperature range for barometer	0 to 40°C (32°F to 104°F)
Digital display features: Time/calendar: Ship Local Time: Local Time: Alarm: Barometric memory: Barometric pressure measurement Barometric data compensation	 Hours, minutes, seconds, month and date Hours and minutes Hours and minutes Hours and minutes Maximum of eight entries (automatic barometric memory function) Measurement range: 800 to 1050 mbars
Additional features: Second-hand stop function Power-saving switch Measurement warning:	 Activated by pulling the crown out to the first position. Activated by pulling the crown out to the first position. Flashing colon (:) and mode indicator. (Warns that the battery is becoming weak.)
Battery	280-206 (battery code: CR2016)
Battery life	Approx. 2 years (after installation of new battery) If use is limited to the following conditions: Alarm: 20 seconds/day Barometric pressure measurement at specified checkpoints: 24 times/day Barometric pressure measurement at arbitrary times: 12 times/day

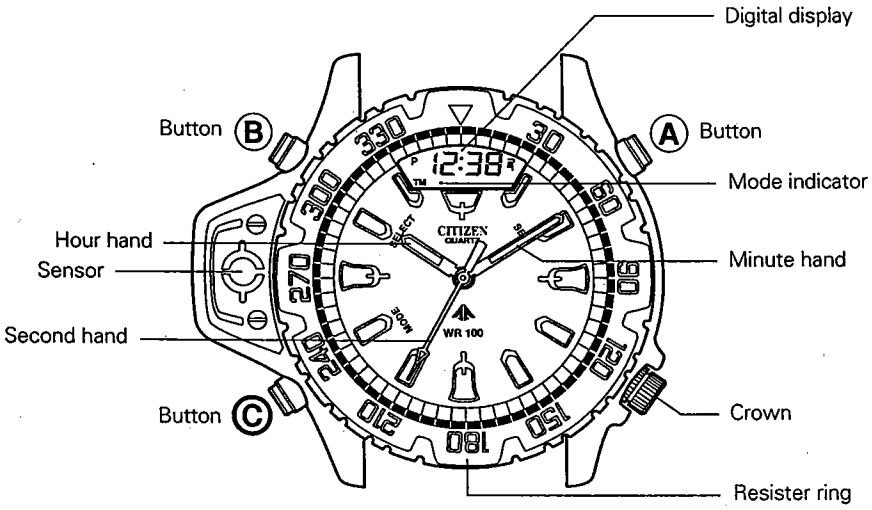
- C146 indicates barometric pressure by in-Hg (inch-Hg) [C140 indicates by mb (millibar)]. The basic functions of C146 are the same as C140. C146 has not been shipped, however, as of September 30 1992.

<Specifications are subject to change without notice.>

3 OVERVIEW

This multi-functional quartz watch is designed to be water-resistant for up to 10 bars and is equipped with an electronic pressure sensor and barometric data display. In addition, other functions such as Ship's Local Time make this watch the ideal choice for sailing and ocean cruising.

Names of parts

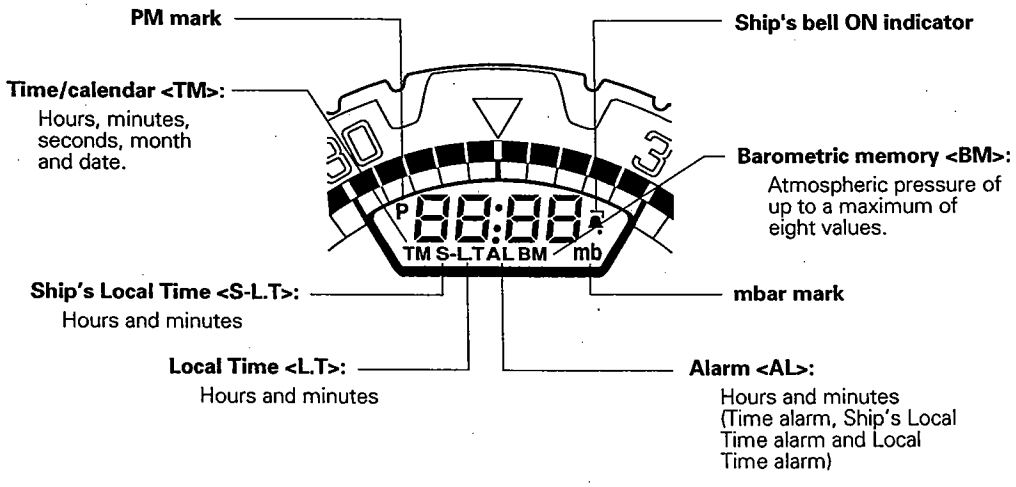


Display functions

[Analog display]

- **Time:** Hours, minutes and seconds

[Digital display]



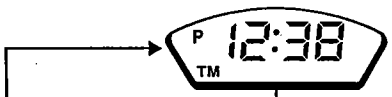
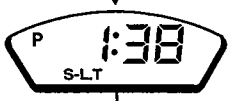
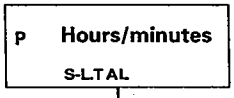
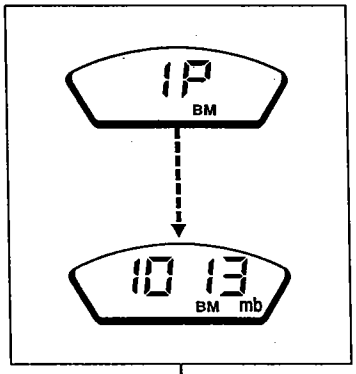
Symbols

: Press and hold down the button.

: Flashing segment

:Auto return

4 MODE OUTLINE

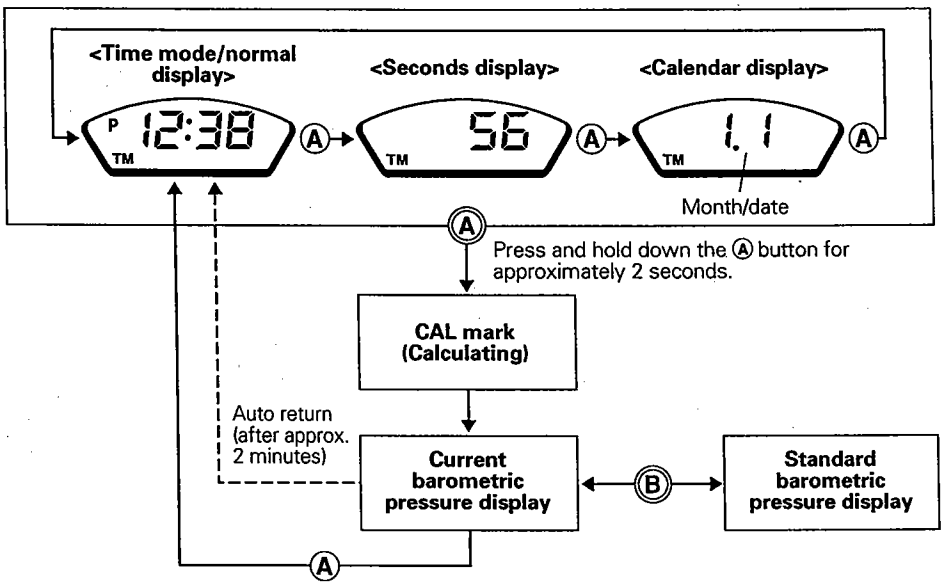
<Mode type>	<Initial display of the mode>	<Display and functions>
Time/calendar <TM>		Hours/minutes/seconds and month/date Measurement of barometric pressure
Ship's Local Time <S-L.T>		Hours/minutes of Ship's Local Time Ship's bell, measurement of barometric pressure and adjustment of time zone
Local Time <L.T>		Hours/minutes of Local Time Measurement of barometric pressure and adjustment of time zone
Alarm <AL>		Time/calendar, Ship's Local Time and Local Time alarms. (or OFF)
Barometric memory <BM>		Automatic recording, measurement and compensation of barometric pressure.

5 DIGITAL DISPLAY OPERATIONS

1. Time/Calendar Mode <TM>

■ Display

The Time/calendar mode displays time (hours/minutes), seconds, calendar (month/date), the current barometric pressure and the standard barometric pressure.



Notes:

- Press and hold down the Ⓐ button for approximately 2 seconds. The current barometric data will be displayed after the [CAL] indicator appears to indicate that the barometric pressure is being calculated.
- Press and hold down the Ⓑ button in the Barometric pressure mode to display the standard barometric pressure.

Functions common to all modes when changing the settings

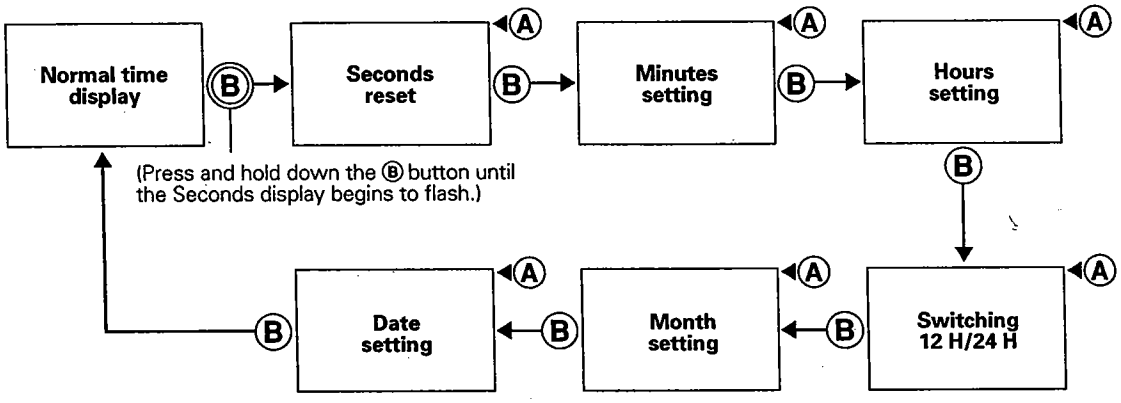
(a) Fast forward
Press and hold down the Ⓐ button to rapidly advance the digits in the flashing segment.

(b) Forced return
Pressing the Ⓒ button while changing the setting (flashing segment) will force the display to return to the normal display.

(c) Auto return
This watch's display will automatically return to the normal display if there is no button input for approximately 2 minutes while changing the setting (flashing segment).

■ Setting the time/calendar

Press and hold down the Ⓑ button while in the normal display to enter the setting mode (flashing segment). Press the Ⓐ button to change the setting.



Notes:

- Adjusting the time in the Time/calendar mode will automatically change Ship's Local Time (S-L.T) and Local Time (L.T) accordingly.

Example:

Before adjustment		After adjustment	Changed time
TM	P 12:38 →	P 2:40	2 hours and 2 minutes
S-L.T	P 1:38	P 3:40	Automatically changes
L.T	P 2:38	P 4:40	by 2 hours and 2 minutes.

- If the watch is in the 12-hour system mode, the P mark is displayed only in the afternoon.
- If a nonexistent date is set, the watch will automatically adjust and display the date for the first day of the next consecutive month upon return to the normal Calendar display.

Example:

(Nonexistent date)

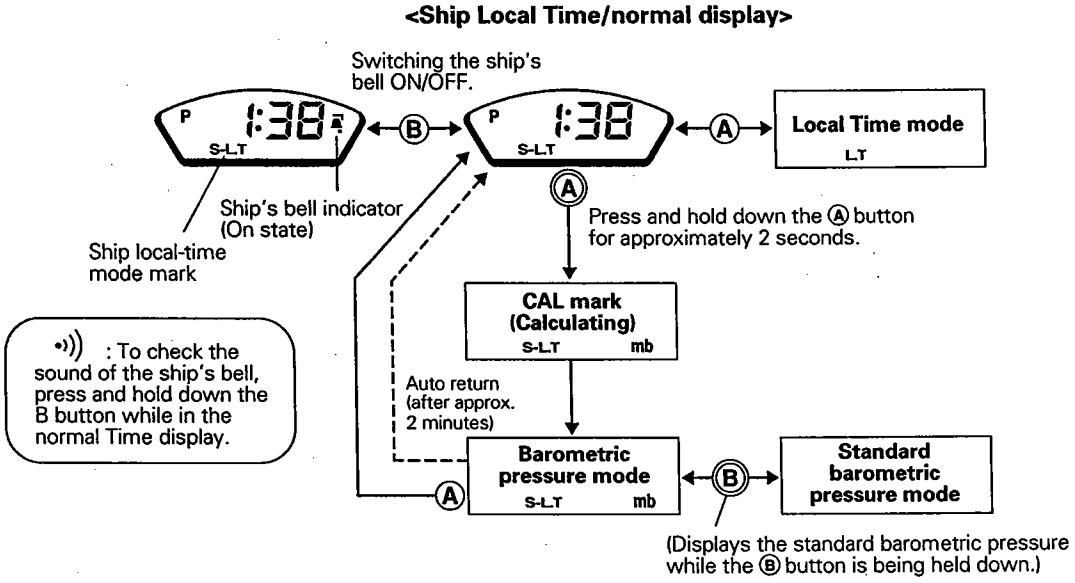
February 30 → March 1

- The 12 H/24 H system of Ship's Local Time (S-L.T) and Local Time (L.T) modes are subordinate to the Time/calendar mode. Therefore, only switch between the 12-hour and the 24-hour system in the Time/calendar mode.

2. Ship's Local Time Mode <S-L.T>

Use this mode to adjust the time zone according to the location.

■ Display



Notes:

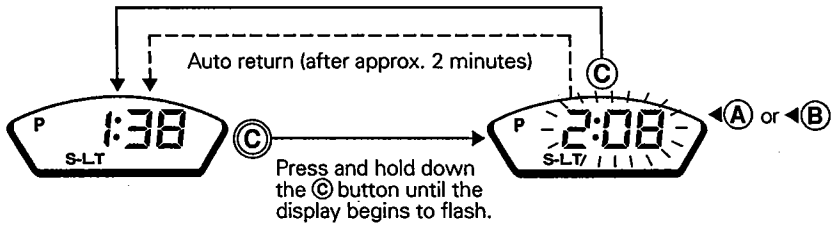
- Press the Ⓑ button in normal Ship's Local Time display to set the ship's bell to ON/OFF. The ship's bell indicator is displayed when the bell is ON.
  The ship's bell sounds every 30 minutes while it is turned on.

Number sounds	Sounding time					
1	0:30	4:30	8:30	12:30	16:30	20:30
2	1:00	5:00	9:00	13:00	17:00	21:00
3	1:30	5:30	9:30	13:30	17:30	21:30
4	2:00	6:00	10:00	14:00	18:00	22:00
5	2:30	6:30	10:30	14:30	18:30	22:30
6	3:00	7:00	11:00	15:00	19:00	23:00
7	3:30	7:30	11:30	15:30	19:30	23:30
8	4:00	8:00	12:00	16:00	20:00	24:00

- When the ship's bell is ON, the bell will sound on the hour and on every half hour (for approx. 3.5 seconds).
- To measure the barometric pressure, press and hold down the Ⓐ button in normal Ship's Local Time display.
- Press the Ⓐ button in normal Ship's Local Time mode to change the watch to the Local Time mode.

■ Setting Ship's local time

<Ship's Local Time/normal display>



Notes:

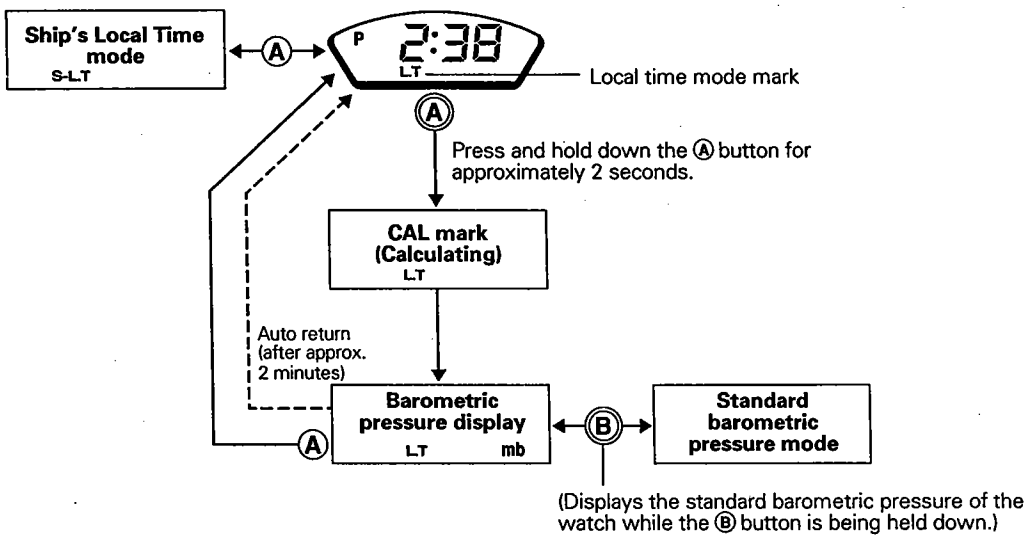
- Changing the time in this mode will not effect the time in other modes.
- During changing of the setting (flashing segment), press the Ⓐ button to advance the digits (UP) in the flashing segment. Press the Ⓑ button to decrease the digits (DOWN).
- Ship's Local Time can be changed in units of 30 minutes.
- Press and hold down the button to rapidly advance the digits.
- The 12 H/24 H system is subordinate to the Time/calendar mode.

3. Local Time Mode <L.T>

Use this mode to set the watch to the local time or to observe the current atmospheric pressure.

■ Display

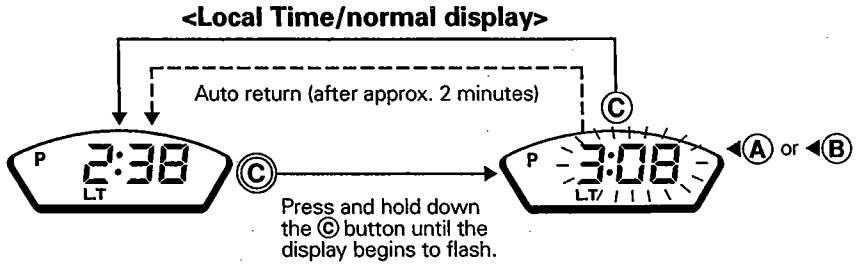
<Local Time/normal display>



Notes:

- Press the Ⓐ button in the normal Local Time mode to change the watch to Ship's Local Time mode.
- Press and hold down the Ⓐ button for approximately 2 seconds while in the normal Local Time mode to measure the barometric pressure.
- "CAL" mark: Indicates that the watch is calculating the barometric pressure.

■ Setting the time



Notes:

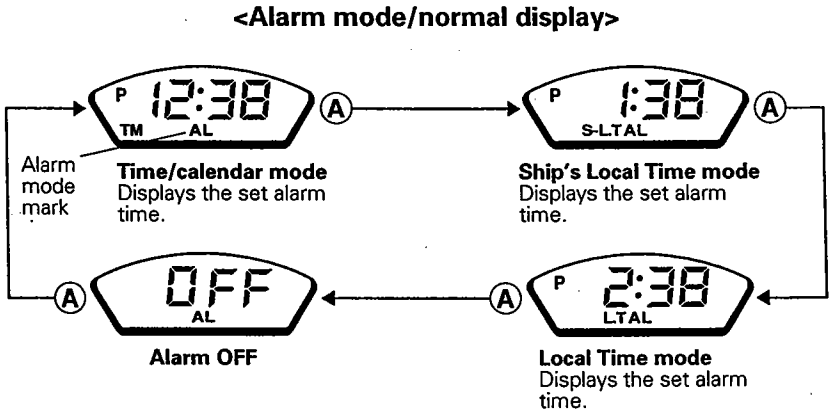
- Press and hold down the Ⓒ button for approximately 2 seconds while in the normal Local Time display to enter the setting mode (flashing segment). Press the Ⓐ button to increase the digits (UP) in the flashing segment. Press the Ⓑ button to decrease the digits (DOWN). Setting can be changed in units of 30 minutes.
- Change the setting in the same manner as with Ship's Local Time mode.
- Changing the time in this mode will not effect the time in other modes.

4. Alarm mode <AL>

(See section B to get to Alarm mode.)

Alarm can be set for the Time/calendar <TM>, Ship's Local Time <S-L.T> or Local Time <L.T> mode, respectively.

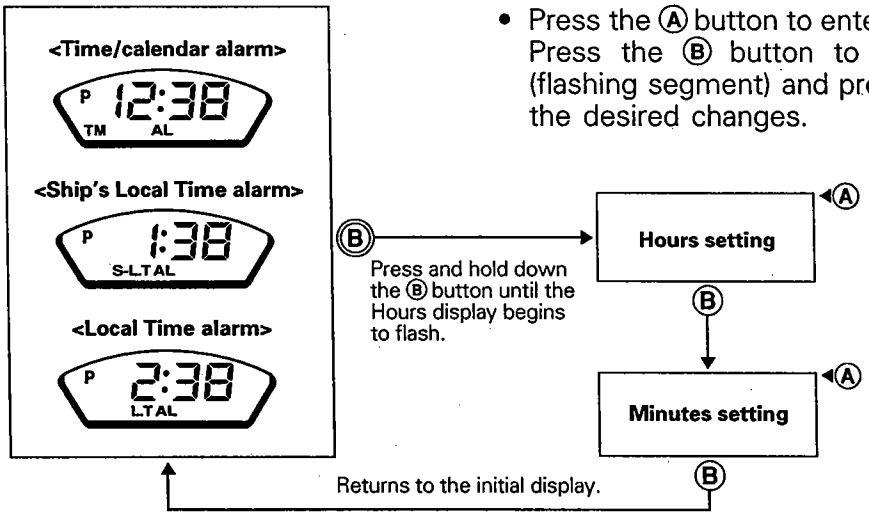
■ Alarm mode selection



Notes:

- The alarm will not sound when the alarm is set to OFF.
- The alarm will sound for 20 seconds at the designated time.
  Press any button to shut the alarm off.
- The alarm will not sound while the watch is in the setting mode (flashing segment) or in the Barometric pressure display.
- **[Sound monitor]:**
  Press and hold down the Ⓐ button while in the normal Alarm display to check the alarm sound.

■ Alarm setting



- Press the Ⓐ button to enter the desired alarm mode. Press the Ⓑ button to enter the setting mode (flashing segment) and press the Ⓐ button to make the desired changes.

- Only one of the Alarm modes may be selected to set to ON.
- Whichever Alarm mode: TM, SLT or LT is on the display when Ⓒ button is pressed to return to Normal Time mode is the only one that will sound and alarm.

Notes:

- The alarm time can only be set in the alarm setting display.
- The alarm will sound for 20 seconds at the designated time. Press any button to shut the alarm off.
- The alarm will not sound when the watch is in the setting, barometric data compensation or barometric pressure measurement mode.
- If you change the set alarm time of one of the three alarm time modes, the set alarm times of the remaining two modes will automatically change to correspond to the newly designated time. The time difference between the Time/calendar (home time), Ship's Local Time and Local Time modes can therefore be maintained.

Example:

Alarm type	Before change	Change	After change
Time/calendar alarm	P 12:38	→	P 2:34
Ship's Local Time alarm	P 1:38	→	P 3:34
Local Time alarm	P 2:38	Changing the Local Time alarm. → P 4:43	→ P 4:43

(In the above example, the set alarm time of the Local Time alarm mode is advanced by 2 hours and 5 minutes.

Consequently, the set alarm time of the remaining two modes also advances by 2 hours and 5 minutes.)

- Alarm can be set in either Time/calendar, Ship's Local Time or Local Time mode. The alarm will sound at the designated time in the set mode only. Confirm the mode indicator to ensure the correct setting. To switch the alarm to OFF, OFF must be on alarm display Ⓒ button is pressed to exit alarm mode.

Example:

To set the alarm to 'ON' in Ship's Local Time mode:

① Change to Ship's Local Time <S-L.T> mode to see that the current time is correct.

② Switch to the Alarm mode and enter Ship's Local Time alarm mode <S-L.T AL>.

③ Set the alarm to the desired time.

④ Press the Ⓒ button to return to either Time/calendar, Ship's Local Time or Local Time mode as desired. As Ⓒ button is pressed, only the alarm selected will be set to ON.

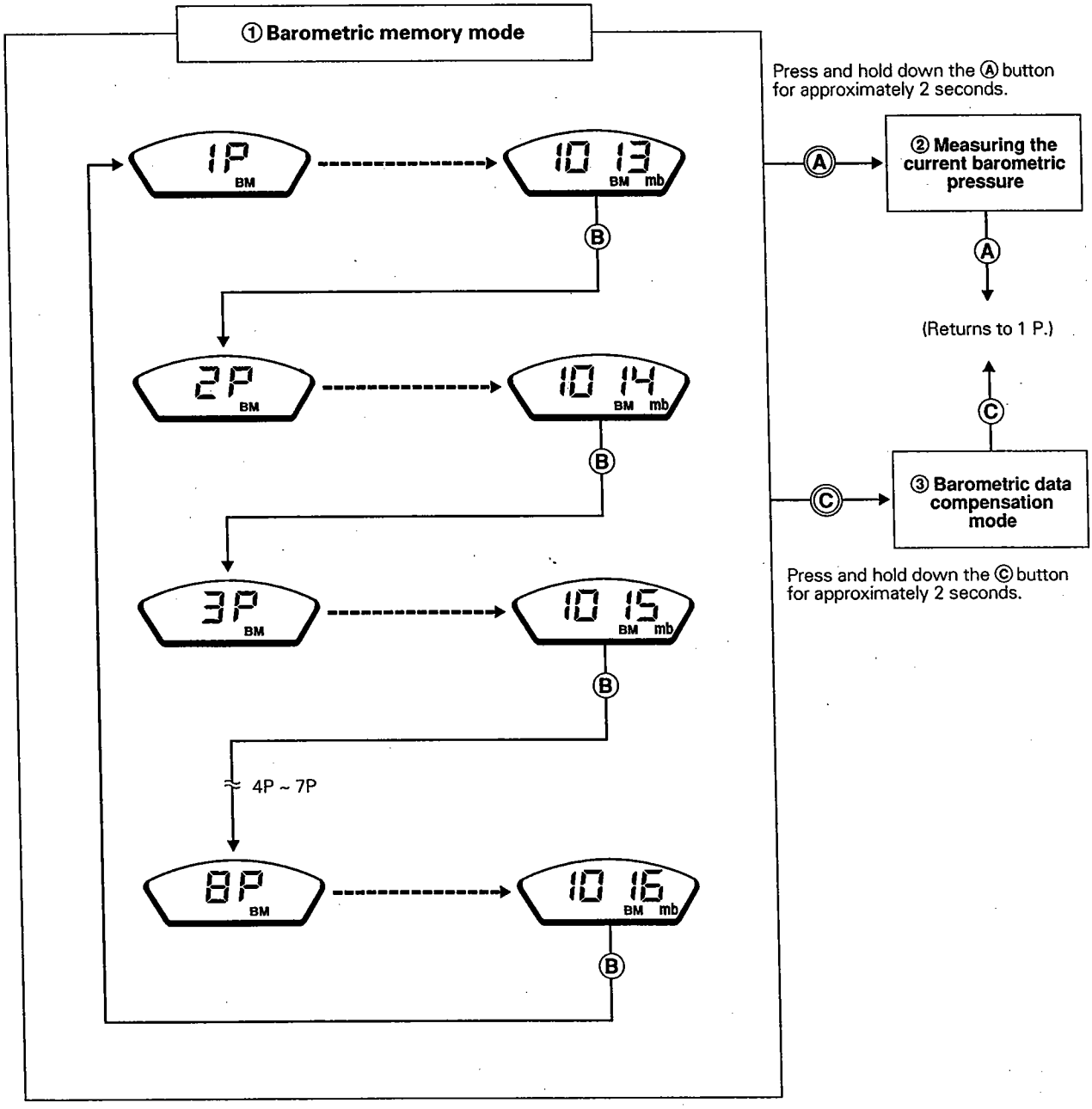
⑤ The alarm will sound for 20 seconds at the designated time in Ship's Local Time.

(In the above example, the alarm is set for Ship's Local Time. Therefore, the alarms for the Time/calendar <TM AL> and Local Time <L.T AL> modes will not sound.)

5. Barometric Memory Mode <BM>

Use this mode to observe changes in the atmospheric pressure. The watch has the memory capacity to store and call up the eight most recent checkpoint entries all of which are recorded automatically (every 59 minutes and 59 seconds).

In addition to calling up a barometric value from memory and measuring of the current barometric pressure, the standard barometric pressure of the watch can be compensated to the current barometric pressure.



① Barometric memory display

- After the watch enters the Barometric pressure mode, the first checkpoint (1P) will be displayed for approximately 0.5 to 1 second, then the first barometric data will appear.
- The checkpoint numbers are displayed in sequence from 1P to 8P each time the Ⓑ button is pressed.
- The most recent barometric data is stored at checkpoint 1P.

Example:

Checkpoint No.	Barometric pressure
1P	1,013 mbars
8P	1,016 mbars

The data up to 8P are displayed in order from the newest one as 1P, 2P, 3P, ·····.

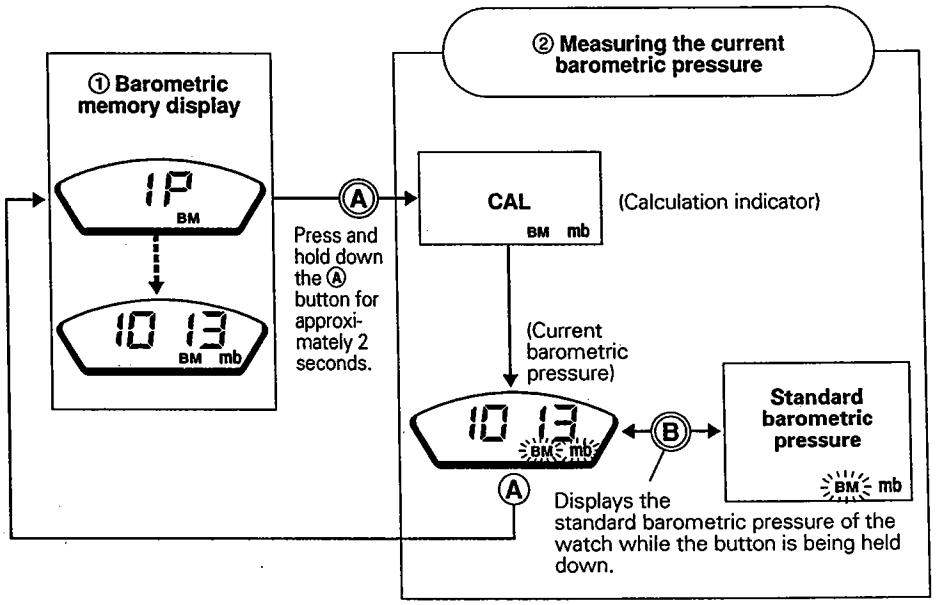
The above example shows that the atmospheric pressure is decreasing.

- The barometric pressure is automatically measured and stored every 59 minutes and 59 seconds. (This time cycle is based on the Time/calendar mode.)
- Measurement range: 800 to 1,050 m-bars (in units of 1 m-bar).

② Measurement of the current barometric pressure

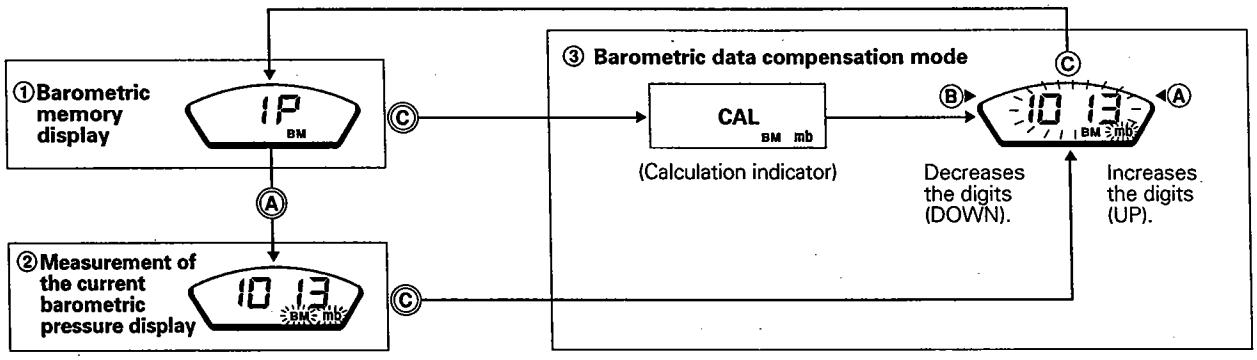
- Press and hold down the Ⓐ button for approximately 2 seconds while in the Barometric memory mode to measure the current barometric pressure.

  The current barometric pressure can be displayed in the same manner as with the Time/calendar, Ship Local Time and Local Time modes.



③ Barometric data compensation mode

- Press and hold down the Ⓒ button for approximately 2 seconds while in the Barometric memory mode to enter the Barometric data compensation mode. Press the Ⓐ button to increase the digits (UP) in the flashing segment. Press the Ⓑ button to decrease the digits (DOWN). (In the same manner, you can change to the Barometric data compensation mode when the current barometric pressure is displayed.)



Use this mode for making compensation to the barometric data of the watch by adjusting the standard barometer..

The barometric memory and measurement of the current barometric pressure are based on the results of the latest barometric data compensation and will remain the basis for measurements until the next compensations are input.

Note that the standard barometric pressure displayed by the watch will not be corrected.

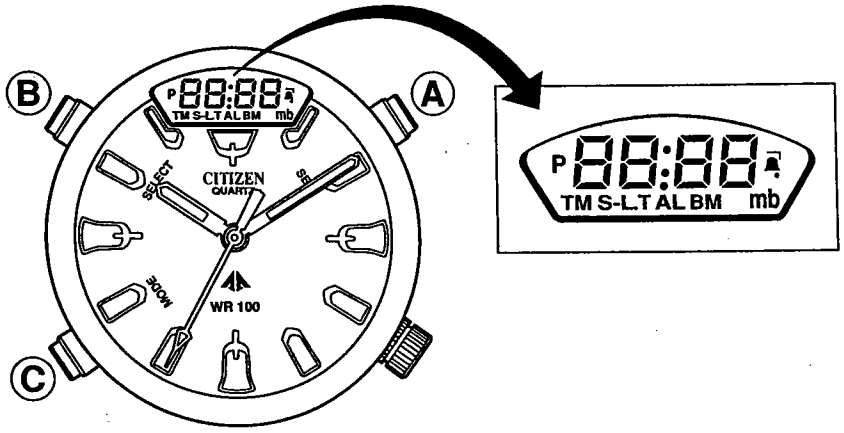
[To cancel compensation]

Pressing the Ⓐ and Ⓑ buttons simultaneously while in the Barometric data compensation mode will delete any barometric data compensation.

After the confirmation beep, barometric data will be based on the standard barometric pressure of the watch.

6 All Reset Operations

Press the Ⓐ, Ⓑ and Ⓒ buttons simultaneously to reset all settings after replacing the battery or when abnormal data is displayed. After releasing the buttons, all segments of the display will be highlighted. A confirmation beep will sound to indicate that the reset operation has been completed.



By this operation, all modos are initialized as follows.

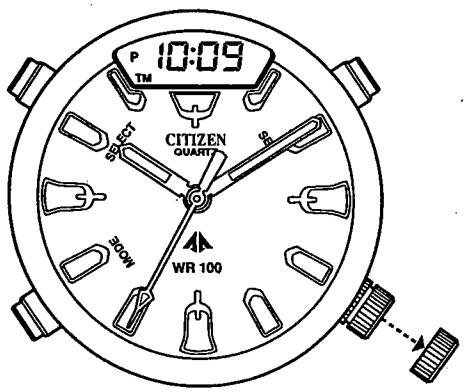
Time/Calendar	(TM)	12:00, 1 (JAN) 1.
Ship's local time	(S-L.T.)	12:00
Local time	(L.T.)	12:00
Alarm	(AL)	OFF
	(BM)	– – – – mb.

After the reset operation, set the correct time and data.

Note:
All data will be cleared after resetting. Make a note of any important data before resetting.

7 Setting the Analog Watch

To adjust time of the analog display, pull the crown out 1 step. The analog watch is set independently of the digital watch.



[8] ADDITIONAL FUNCTIONS

1. [Measurement warning]

When the battery voltage is low, measurement of barometric pressure cannot be performed. The colon (:) and mode indicator will begin to flash in the normal mode to indicate the battery should be replaced. (However, the colon and mode indicator do not flash in the setting and barometric data compensation modes.)
Under this condition, accurate measurement is impossible.

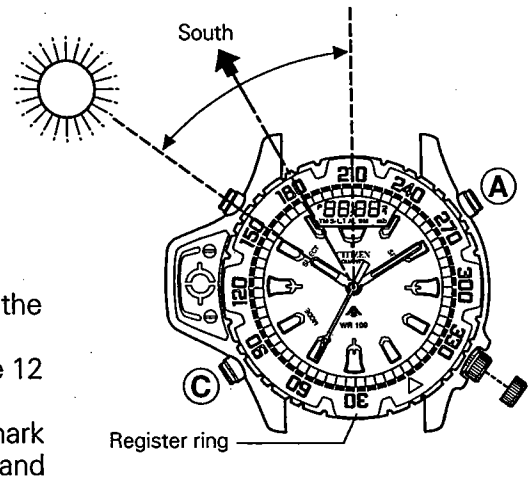
2. [Directional register ring]

This watch has a directional register ring for use in the Northern Hemisphere only. This compass feature is based on the position of the sun and should only be used as an approximate direction finder.

Using the register ring:

▽ indicator	Direction
0°	North
90°	East
180°	South
270°	West

Set the position of the hour hand in the direction of the sun.
The center between the hour hand's position and the 12 o'clock position is south.
Then turn the direction register ring and set the mark 180° (for the south) to the center between the hour hand and the 12 o'clock position.
The east (E), west (W), south (S) and north (N) directions can then be found on the direction register ring. (See the figure below.)



3. [Sound monitor]

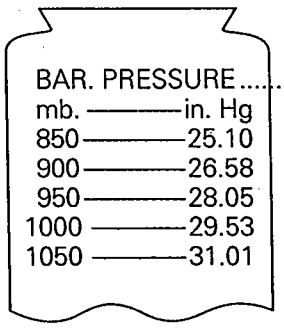
- Checking the ship's bell sound:

  Press and hold down the Ⓑ button in the normal Ship Local Time mode to monitor the sound of the ship's bell.

- Checking the alarm sound:
  Press and hold down the Ⓐ button in the normal Alarm mode to monitor the alarm sound.

4. [Printing on the band]

Some models have a conversion table for barometric pressure (mb and in. Hg) printed on the band.



(Atmospheric pressure)
mb. = millibar
in. Hg = inches of mercury

[9] IMPORTANT PRECAUTIONS FOR INSTRUCTING THE USERS

The following are important precautions for instructing the users of CITIZEN QUARTZ CRUISING WATCH.

1. Inhibition of use

This watch is not a professional precision measurement device as defined by any of the various domestic or internationally recognized standards organizations.

Use of this watch under certain conditions runs the risk of exceeding the capacities of this product. The following should therefore be avoided:

- Using the watch for judging safety under dangerous circumstances. (For example, forecasting changes in weather conditions to judge if plan or current situation is safe.)

2. Barometric pressure measurement

- The barometric pressure measurement only as a guideline to observe changes in atmospheric pressure.
- The barometric pressure displayed by this watch is the atmospheric pressure detected by the sensor in the watch. The barometric pressure reading changes with any change in altitude.

  The barometric pressure displayed by this watch is different from the barometric pressure in weather charts or weather reports, which are calculated on the basis of an altitude of 0 m of sea level.

  This barometric measurement function is to observe changes in the barometric pressure in the same location.

  For more accurate results, perform several measurements at the same location.

The barometer of this watch have not been authorized by any official institute. Accordingly, never use this watch under a dangerous condition and forcast meteorogical condition.

3. Use on an airplane

The barometric pressure in a passenger airplane is kept to the value about 20% lower than the standard atmosphere on the ground while it is cruising stably. Accordingly, the correct altitude cannot be indicated. However, if the watch is set to the barometric pressure mode, the barometric pressure in the airplane is indicated.

(The barometer cannot correctly measure air pressure in an elevator, air dome stadium, etc, where the air pressure is controlled.)

4. Compass

The compass feature on this watch is based on the position of the sun, and should be used only in the northern hemisphere. Changes in latitude and the seasons may also cause directional misreadings. This compass should be used as an approximate direction finder.

5. Sensor

The sensor used in this watch is a precision measurement instrument.

If it is disassembled or a shock is given to it, it may not measure accurately any more.

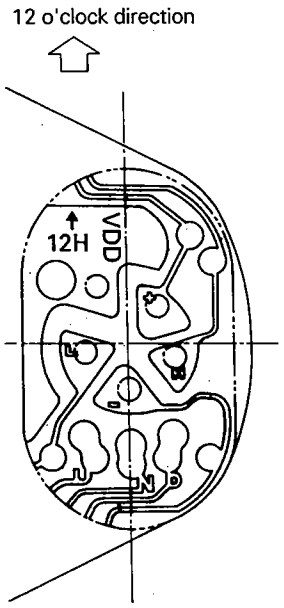
6. Battery

The battery life is approximately two years with normal use (see battery life in the specifications) after replacement by a new batter. Actual service life depends on the conditions under which the watch is used.

10 PRECAUTIONS FOR REPAIR

Cal 14※ and Cal 04※ are in the same family, and the basic parts configuration, structure, precautions for disassembling and assembling of them are the same.

- **Installation of sensor**



1) The sensor has directional properties. Install it in the case with the stamp of 12H in the direction of 12 o'clock point. if it is installed inversely, barometric pressure and altitude are indicated abnormally, or a bar (– – – –) is indicated instead of them.
2) The sensor and the circuit are adjusted as one unit, thus **be sure to replace them as a unit.** If only either of them is replaced, the barometric pressure etc. Cannot be measured accurately.
3) After the sensor is installed, confirm it is not bent.

- **Barometric pressure indicated when the case is fitted**

The sensor of this watch has five coil springs. When the case is fitted, an unstable force is temporarily applied to the sensor, and a value a little higher than the true value may be indicated. This does not mean a trouble. 30 ~ 60 minutes after the case back is tightened, the springs are stabilized and accurate values will be indicated.

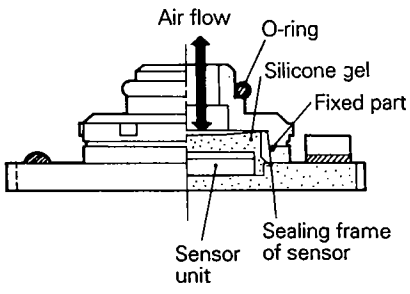
- **Sensor contact springs**

Five sensor contact springs are used in this watch. If they are bent of fatigued, they are not in perfect contact with the sensor, and true values may not be indicated.

If the contacts are stained or dirt sticks to them, sufficient electrical continuity cannot be made, and true values cannot be obtained. In this case, remove the stain and dirt.

- **Handling of sensor**

Section of sensor



The sensor is protected by gel material as shown in the figure at left. Never stick it with a bar.

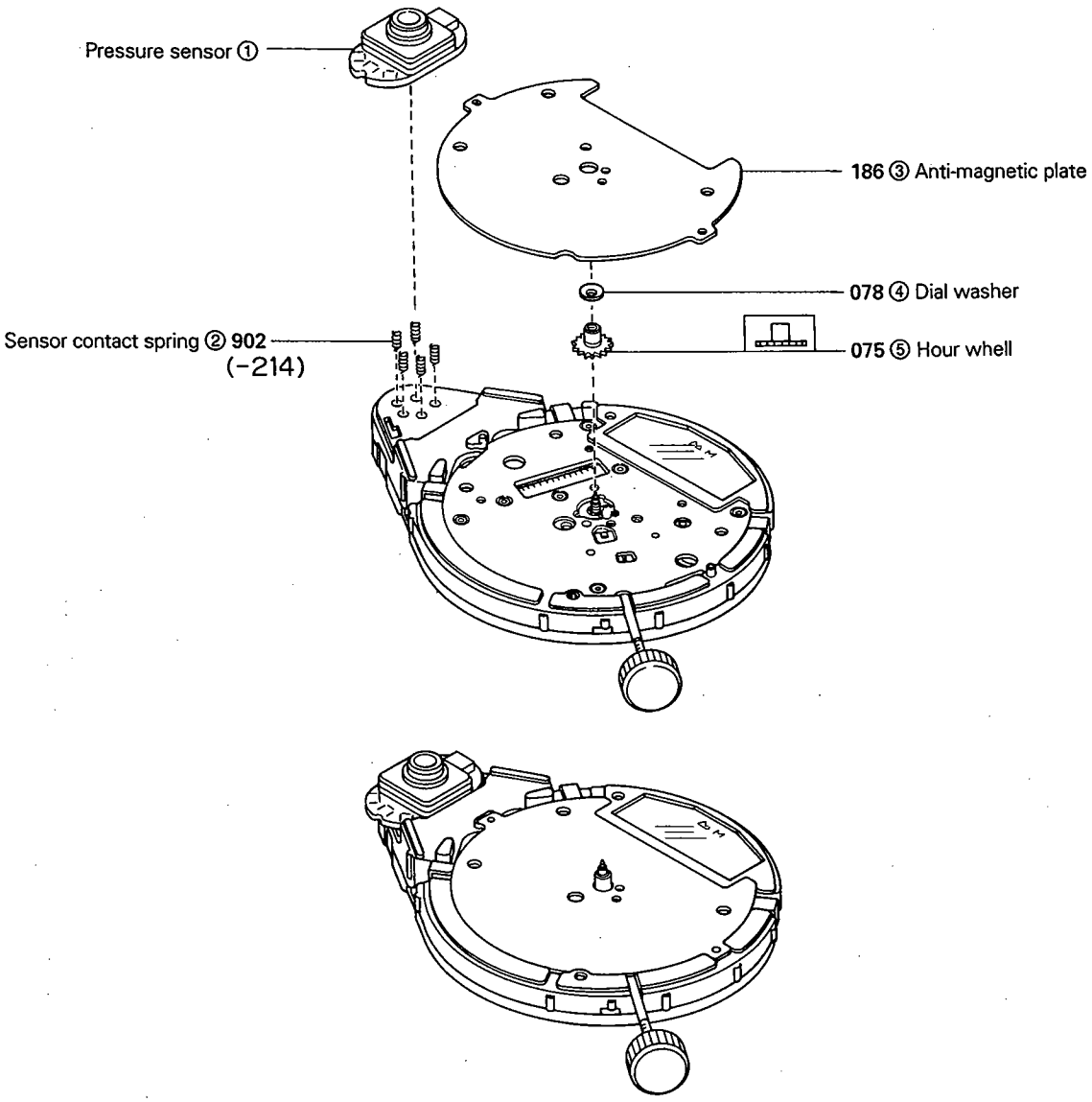
The sensor is covered with the sensor cover (secured with two screws). If the air passage is clogged with dust, the measuremenill be inaccurate. In this case, remove the sensor cover and remove the dust so that air will flow through the passage.

The sensor is made of plastic. Since it is filled with silicone gel (black soft material), do not wash it. If dust has entered it and caused malfunction of the sensor, replace the sensor and the circuit as one set.

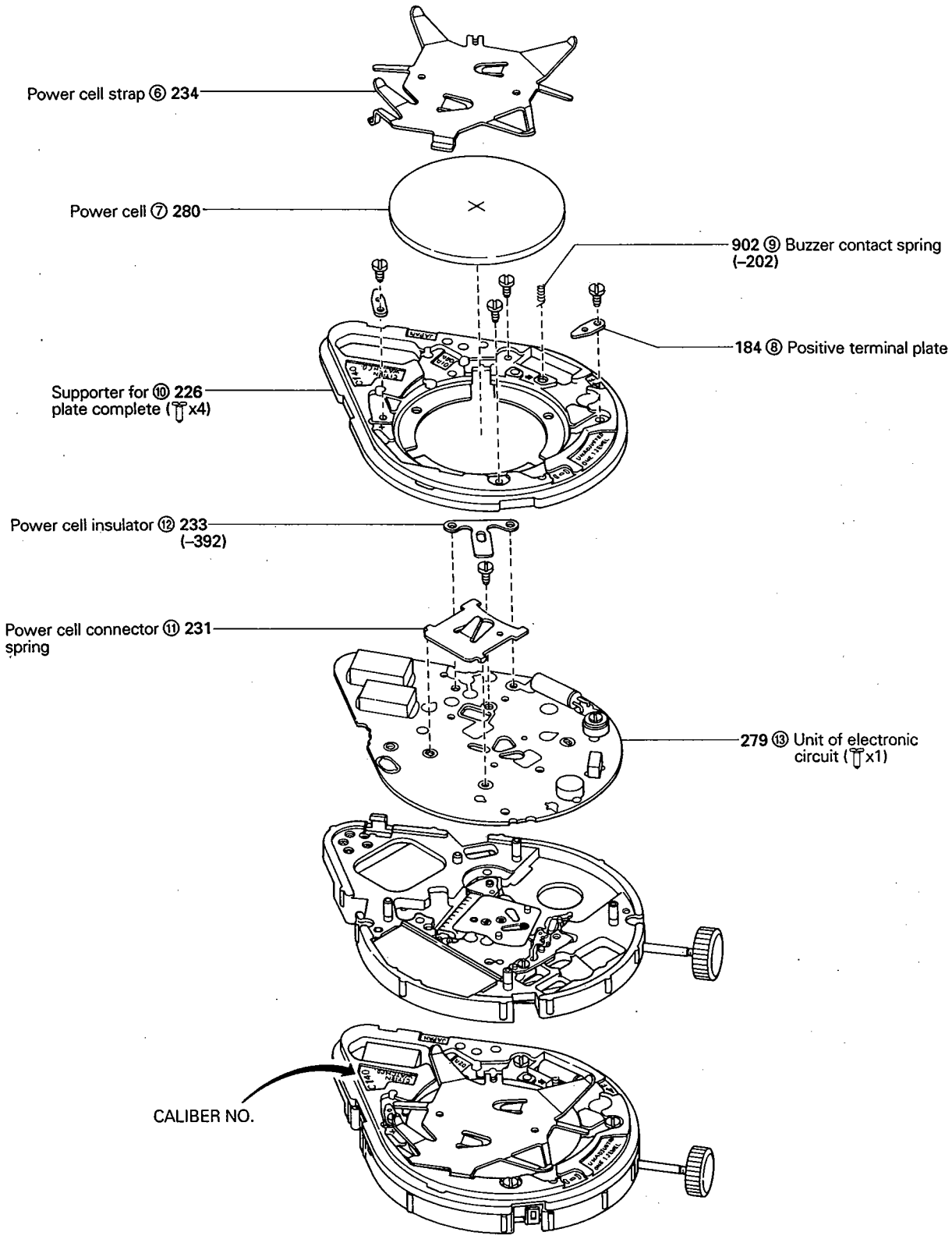
11 DISASSEMBLY AND ASSEMBLY OF MODULE

Disassemble procedure ① → ⑮
Assemble procedure ⑮ → ①

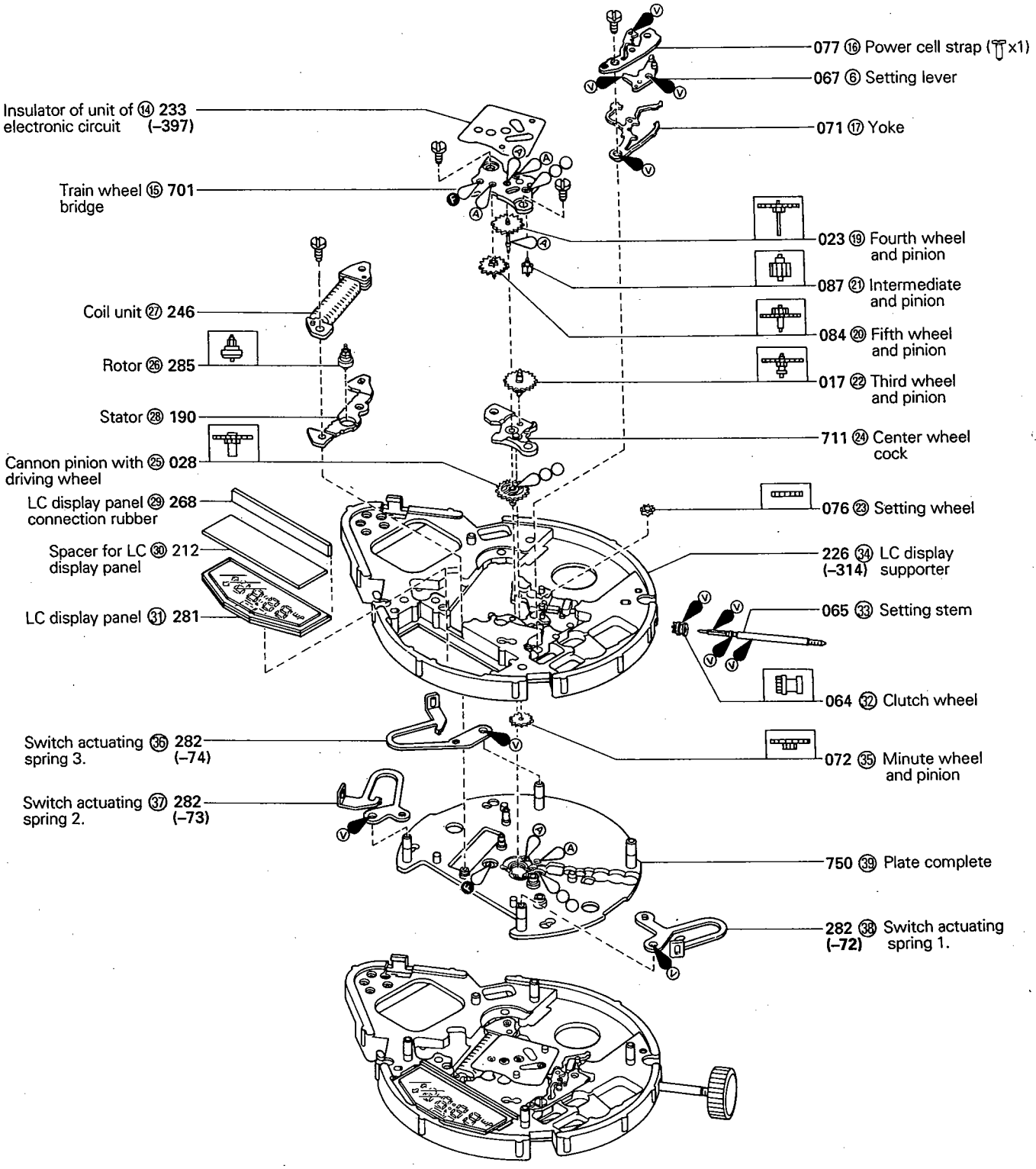
- Lubrication symbols
  - Ⓐ : A-Lube oil
  - Ⓥ : V-Lube oil
  - Ⓕ : F-Lube oil
  - Ⓒ : CH-1 oil



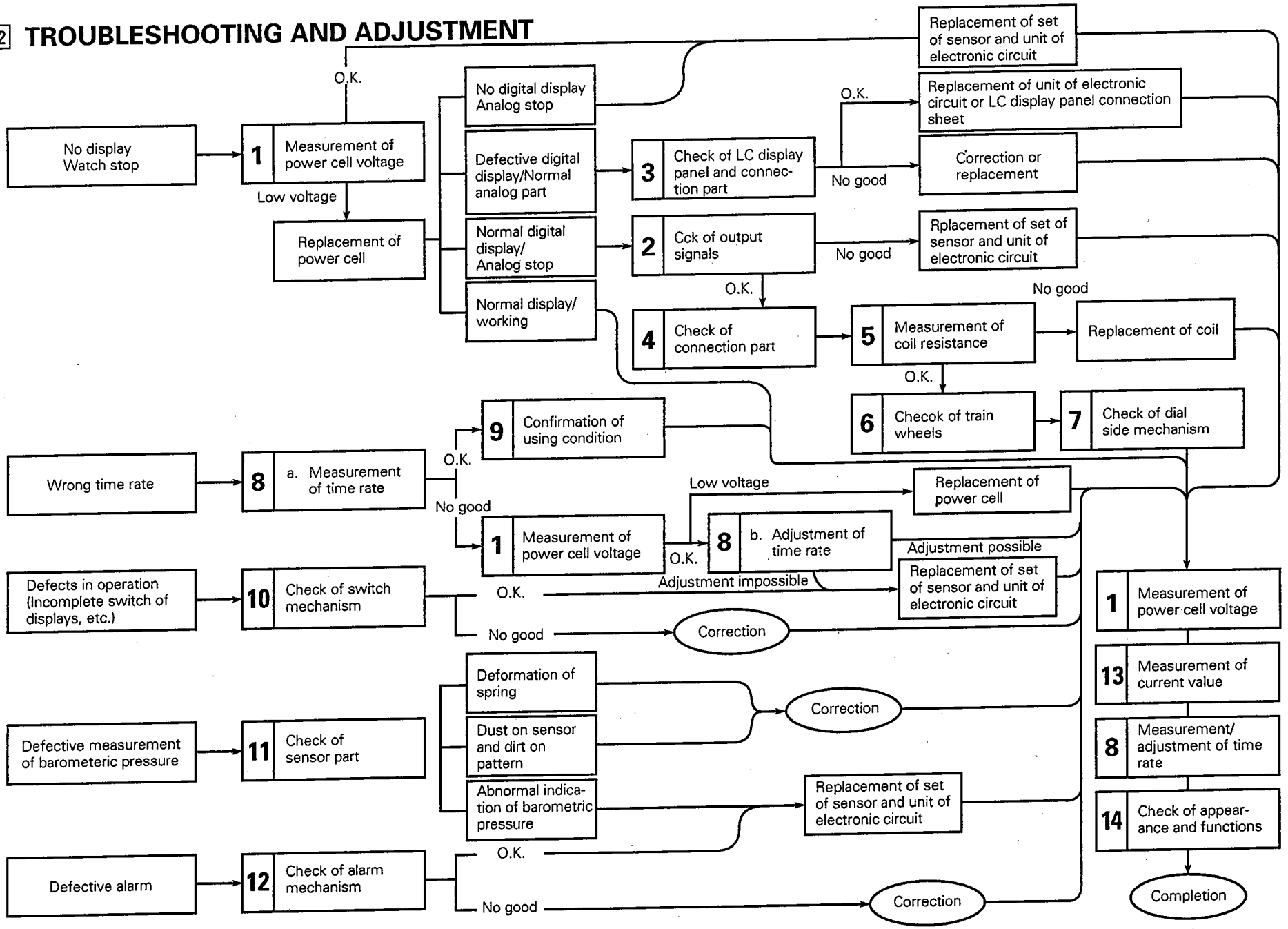
Note: Anti-magnetic plate has directional properties. If it is inverted, dial cannot be mounted.

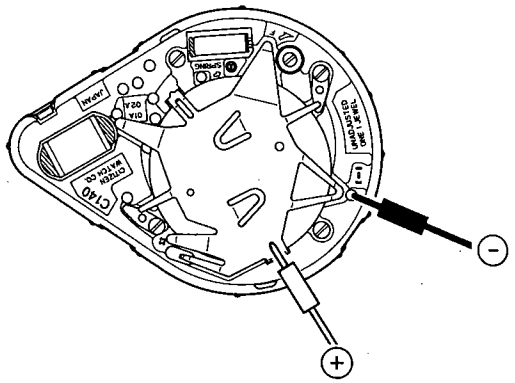
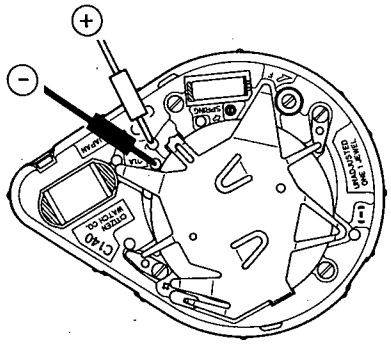


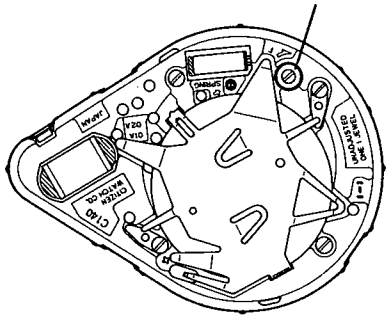
Note: Barometric pressure sensor and unit of electronic circuit are supplied as a set.
Be sure to replace both of them at the same time.


077 ⑯ Power cell strap (T x1)
067 ⑥ Setting lever
071 ⑰ Yoke
Insulator of unit of ⑭ 233 electronic circuit (–397)
Train wheel ⑮ 701 bridge
023 ⑲ Fourth wheel and pinion
087 ㉑ Intermediate and pinion
084 ⑳ Fifth wheel and pinion
017 ㉒ Third wheel and pinion
711 ㉔ Center wheel cock
076 ㉓ Setting wheel
226 ㉞ (–314) LC display supporter
065 ㉝ Setting stem
064 ㉜ Clutch wheel
072 ㉟ Minute wheel and pinion
750 ㊴ Plate complete
282 ㊳ (–72) Switch actuating spring 1.
Coil unit ㉗ 246
Rotor ㉖ 285
Stator ㉘ 190
Cannon pinion with ㉕ 028 driving wheel
LC display panel ㉙ 268 connection rubber
Spacer for LC ㉚ 212 display panel
LC display panel ㉛ 281
Switch actuating ㊱ 282 spring 3. (–74)
Switch actuating ㊲ 282 spring 2. (–73)

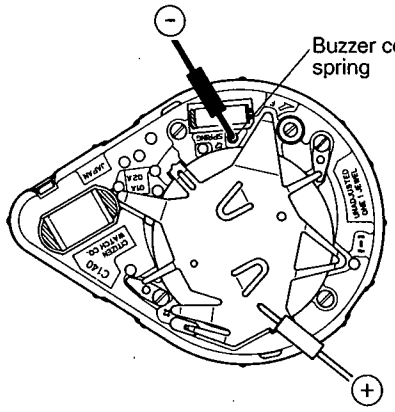
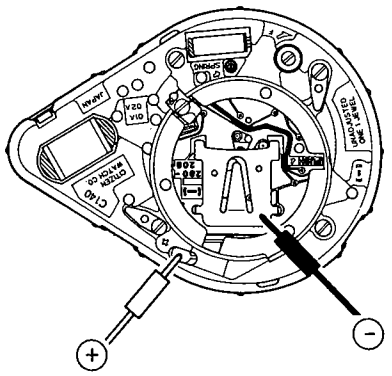
12 TROUBLESHOOTING AND ADJUSTMENT



Check Points	How to check	Results & treatment
❶ Measurement of power cell voltage	[Refer to Technical Manual, Basic Course II-1-a] <Tester range: DC 12V> 	• **Over 2.8 V** → Normal • **Under 2.8 V** → Replace the power cell.
❷ Check of output Signals	[Refer to Technical Manual, Basic Course II-1-b]  <Tester range: DC 0.3 V> (The tester lead pins have no polarity.)	• The tester pointer swings every 1 second. → Normal • The tester pointer does not swing. → ❹ Check the connection parts ⇩ • The connections are normal. → Replace the electronic circuit unit and sensor as a set.
❸ Check of LC display panel and connection part	[Refer to the Digital Section of Technical Manual, Basic Course II-2-a] • Inspection of all segments (Press the Ⓐ, Ⓑ and Ⓒ buttons at the same time to turn on all the segments, and check for defective ones. • Continuity test on LC display panel, cell connection rubber and plate complete Check the parts for stain, breakage, etc.	• LC display panel, connection rubber or plate complete is not installed correctly. → Install correctly • Parts are stained or dirty. → Remove stain and dirt. • Parts are cut, broken of 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 & treatment
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: Rx10Ω>	• **2.6 kΩ ~ 3.2 kΩ** → Non-defective • Outside range of **2.6 kΩ ~ 3.2 kΩ** → Non-defective
❻ Check of train wheels	[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 and adjustment of time rate	[Refer to Technical Manual, Basic Course II-2-d] 〈 Measurement range: Analog, 2 sec. 〉 Trimmer capacitor  • Turn trimmer capacitor to right and left to adjust time rate.	• Can be adjusted. → Normal The accuracy of this watch is ±20 sec/month, thus normal if ±0.6 sec/day or less. • Cannot be adjusted or large error is made after adjustment. → Replace the electronic circuit unit and sensor as a set.
❾ Confirmation of using condition	[Refer to Technical Manual, Basic Course II-2-e]	

Check Points	How to check	Results & treatment
⑩ Check of switch mechanism	1. Inspection of movement. • Press the switch return spring 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. Apply it to the packing of the sensor, too.	• 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.
⑪ Check of sensor	Referring to the repair method and precautions explained in [10] PRECATION FOR REPAIR, perform the following inspection. 1. Check the sensor contact spring for deformation. 2. Check the contact parts of sensor and circuit for stain, dust, etc. <Abnormal indication> If the digital indicator indicates abnormally, be sure to perform the all-reset operation, as when the power cell is replaced. 3. Only bar (– – – –) is indicated. 4. Barometric indication is abnormal. 5. Memory function does not work.	• Spring is deformed. → Replace contact spring. • Sensor or circuit is stained or dirt. → Remove stain and dirt. Confirm watch has been handled normally. → See [4] to [8] • Sensor is installed upside down. → Set correctly. • Indication is still abnormal after all-reset operation. → Replace the electronic circuit unit and sensor as a set.

Check Points	How to check	Results & treatment
⑫ Check of alarm mechanism	[Refer to Technical Manual, Basic Course II-1-d] *1. Set the module in the case, and check output of alarm with the case back removed. (1) Set the watch in alarm mode. (2) Apply ⊕ lead pin to power cell surface and ⊖ lead pin to buzzer contact spring, then press and hold Ⓐ button. <Tester range: DC 0.3 V>  *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 swings every time Ⓐ button is pressed. → Normal ⇩ • Perform inspection in *2. ⇩ • Tester pointer does not swing. → Replace the electronic circuit unit and sensor as a set.
⑬ Measurement of current value	[Refer to Technical Manual, Basic Course II-1-f] (1) Set the power cell to tester. (2) Set the lead pins of tester to the module, and perform the all-reset operation. <Tester range: DC 12μA>  Since current for alarm flows after all-reset operation, much current is consumed temporarily. Measure after it is stabilized.	• Measured value of module complete is **under 2.2 μA.** → Normal • Measured value of module complete is **over 2.2 μA.** → Inspect train wheel and dial side mechanism, and remove dust and stain, and oil. • Pull the crown to reset power consumption switch. **Under 1.7 μA.** → Normal **Under 1.7 μA.** → Electronic circuit unit is defective. ⇩ Replace the electronic ciruit unit and sensor as a set.

Check Points	How to check	Results & treatment
⓮ Check of appearance and functions	[Refer to Technical Manual, Basic Course II-2-f] • Check inside of case for dust and stain. • Confirm case back is tightened firmly. • Check operation of setting switches for normality. • Check segment for normality (See ❸ check of LC display panel and connection part.)	

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