

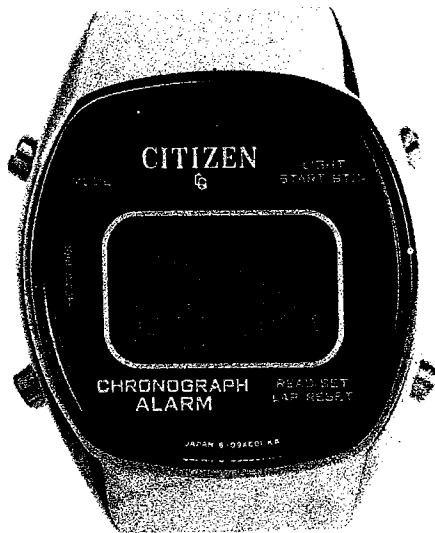
***TECHNICAL  
INFORMATION***

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**CITIZEN QUARTZ**

**Cal.No.941 ※※**

## § 1. OUTLINE



This is a popular-type digital quartz crystal watch for ladies, which has been designed to develop a new field of the watch market.

It features the alarm function of the "caseback" (vibrating plate) type along with the compact incorporation of the chime and stopwatch functions. For the appearance design of the watch, the digit selection button (S) button) is located at the 8-o'clock position to give a neat external form as a whole.

## § 2. FEATURES

### 1) Popular-type and multi-function digital quartz crystal watch for ladies

- Alarm function
- Chime display
- Stopwatch function
- Illumination lamp
- Alarm monitor
- Fully automatic calendar (including leap years)

### 2) Digital Frequency Control (DFC)

When measuring the time rate, the measurement unit time (MEASURE TIME) must be set to "10 sec." or its integer-fold value.

This is based on the fact that the frequency is corrected every 10 sec. within the circuit. With the unit time of "2 sec.", it is impossible to obtain the correct measurements.

This watch incorporates no trimmer condenser, and thus the time rate can be controlled by the break or make of the terminal pattern for the "Digital Frequency Control" mentioned above. However, the time rate adjustment is not given generally at the market.

### 3) Power cell life of about 2 years

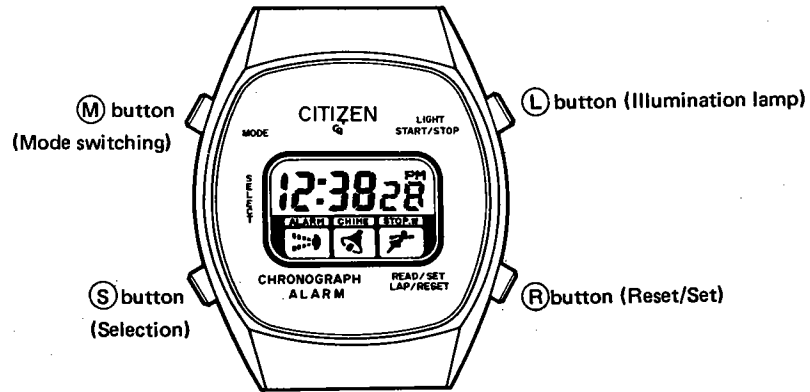
The watch can operate on just a single unit of the small-size silver oxide cell for about 2 years with no discontinuation, although it incorporates multiple functions.

§ 3. SPECIFICATIONS

Caliber No.	9410-00A
Module	Outer dia.: 19.2mmφ Thickness: 4.43mm (Power cell part 5.25mm)
Oscillation	32,768 Hz
Accuracy	±15 sec./month at normal temperatures
Digital display	<ul style="list-style-type: none"> <li>●FE twist nematic LC (liquid crystal)</li> <li>●2-division multiplex driving</li> <li>●Constant time display: Hour, minute, second and AM/PM</li> <li>●Display via button operation: Month, date and day</li> <li>●Alarm display: by switching</li> <li>●Chime display: by switching</li> <li>●Stopwatch display: by switching               <ul style="list-style-type: none"> <li>(a) Minute, second and 1/100 sec. (0'00''00 ~ 19'59''99)</li> <li>(b) Hour, minute and second (0:20'00'' ~ 11:59'59'')</li> </ul> </li> </ul>
Integrated circuit	C/MOS-LSI
Effective temperature range	0° ~ 55°C
Additional functions	<ul style="list-style-type: none"> <li>●Illumination lamp</li> <li>●Fully automatic calendar (including leap years)</li> <li>●Alarm monitor</li> <li>●Function marks</li> </ul>
Power cell	Parts No. : 280-44 Manufacturer's code: SR926W Nominal voltage : 1.55V Size : 9.5φ x 2.6mm Capacity : 38mAH Life time : About 2 years (5 sec. lamp lighting, 30 sec. alarm ringing and 24 times chime per day)

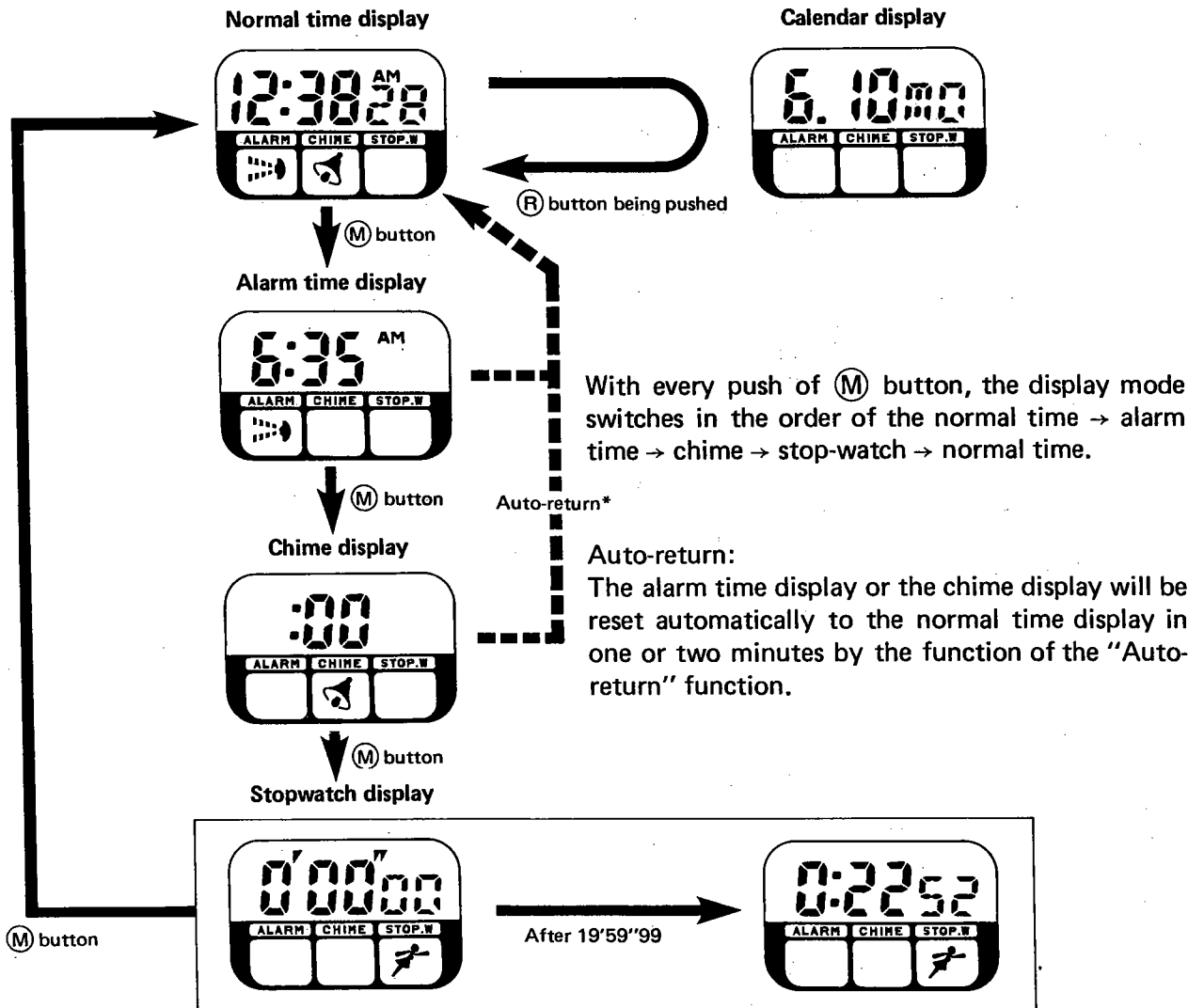
§4. HANDLING INSTRUCTION

1) Push-buttons

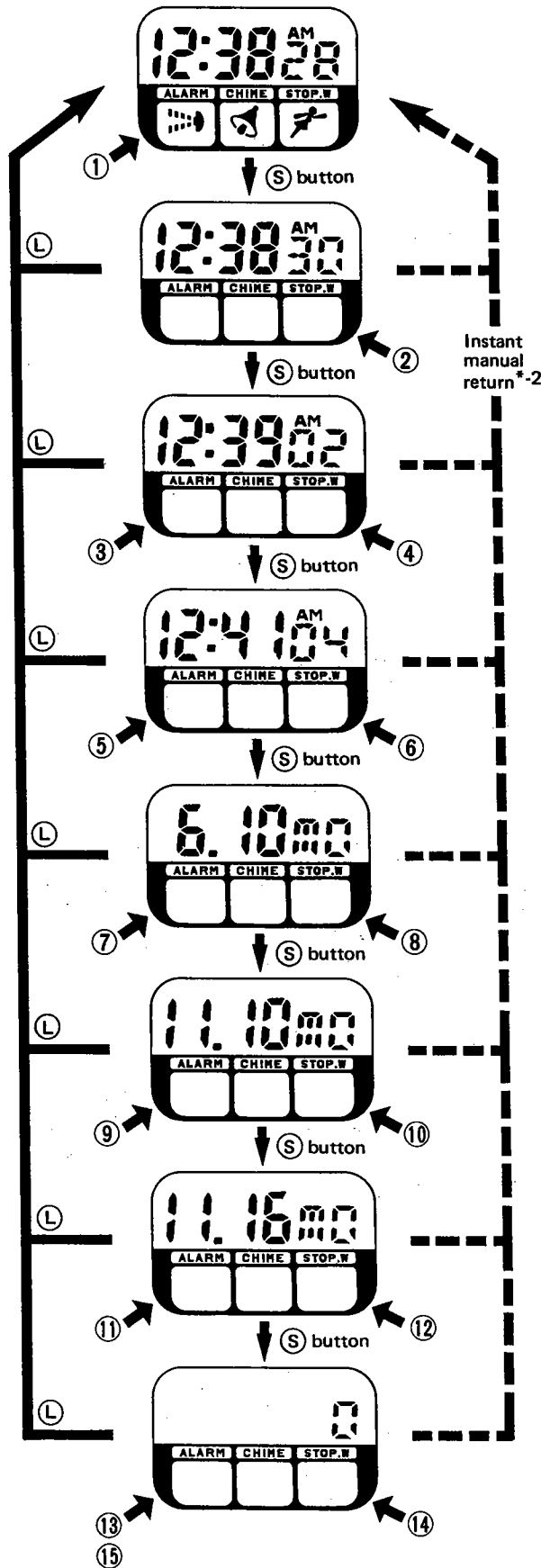


12:38'28" PM (Alarm and chime ON, stopwatch operating)

2) Mode switching



3) Time setting



Normal time display

- ① With push of (S) button about 2 seconds under the normal time display, the "second" has flashing.

"Second" setting

- ② With push of (R) button, the "second" is reset to 0 when the "second" reads 00 ~ 29. In case the "second" reads 30 ~ 59, the "minute" is carried by one.

"Minute" setting

- ③ With push of (S) button in the "second" setting mode, the "minute" has flashing.
- ④ The "minute" is set with push of (R) button.

"Hour" setting

- ⑤ With push of (S) button in the "minute" setting mode, the "hour" plus "AM/PM" have flashing.
- ⑥ The "hour" is set with push of (R) button. Make sure AM or PM when setting the "hour".

"Month" setting

- ⑦ With push of (S) button in the "hour" setting mode, the display changes from "hour, minute and second" to "month, date and day" along with the "month" flashing.
- ⑧ The "month" is set with push of (R) button.

"Date" setting

- ⑨ With push of (S) button in the "month" setting mode, the "date" has flashing.
- ⑩ The "date" is set with push of (R) button.

"Day" setting

- ⑪ With push of (S) button in the "date" setting mode, the "day" has flashing.
- ⑫ The "day" is set with push of (R) button.

"Year" setting

- ⑬ With push of (S) button in the "day" setting mode, the "year mark" has indicating.
- ⑭ The "year" is set with push of (R) button. In this case, the year which can be divided by 4 is set to 0. For instance, the "year mark" is set to 0 for 1980 since that year is divisible by 4. And only 0 has flashing. The "year mark" varies in the order of 0 → 1 → 2 → 3 → 0.
- ⑮ With another push of (S) button in the "year" setting mode, the mode is reset to the normal time display.

•The flashing areas are shown in red color.

**\*-1 (Instant manual return)**

The normal time display can be reset instantly from any mode of display with push of (L) button, although the time and calendar display changes normally in the order of second → minute → hour → month → date → day → year.

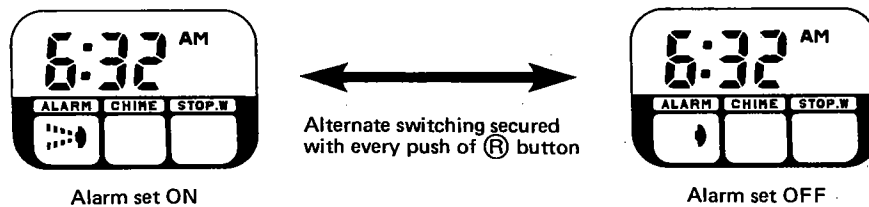
**\*-2 (Auto-return)**

The normal time display can be reset automatically in one or two minutes in the mode of time setting owing to the "auto-return" function.

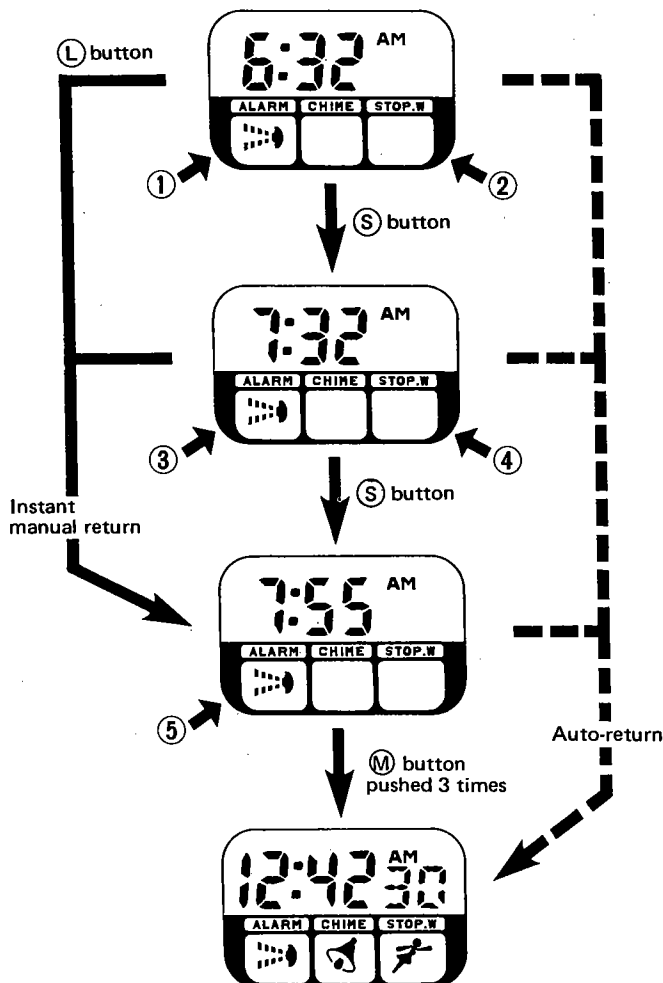
**4) Alarm function**

With a push of (M) button in the mode of normal time display, the alarm time display is secured.

**(1) ON/OFF of alarm setting**



**(2) Setting of alarm time**



**Setting of alarm "hour"**

- ① With push of (S) button about 2 seconds in the mode of alarm time display, the "hour" plus "AM/PM" have flashing.
- ② The "hour" is set with push of (R) button, making sure AM or PM.

**Setting of alarm "minute"**

- ③ With push of (S) button in the "hour" setting mode, the "minute" has flashing.
- ④ The "minute" is set with push of (R) button.

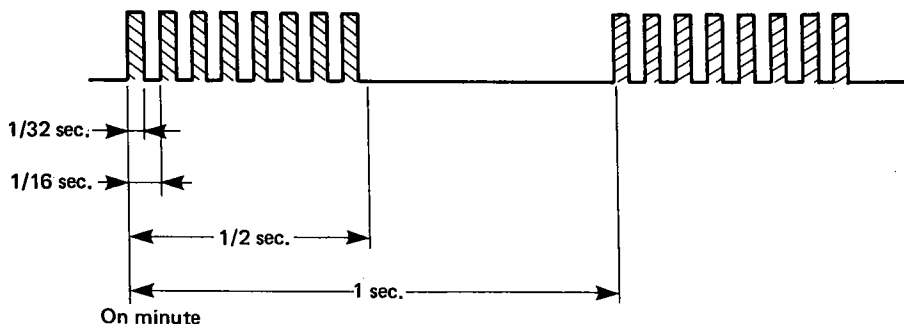
**Display of alarm time**

- ⑤ With the second push of (S) button, the "minute" ceases flashing. And the alarm time is displayed again.

**Normal time display**

The alarm time display is changed to the normal time display by pushing (M) button three times. With this watch, however, the normal time display can be reset automatically in one or two minutes owing to the "auto-return" function.

(3) Ring of alarm (every minute)



(a) The alarm rings in short duration 8 times per second and for 30 seconds in all at the set time.

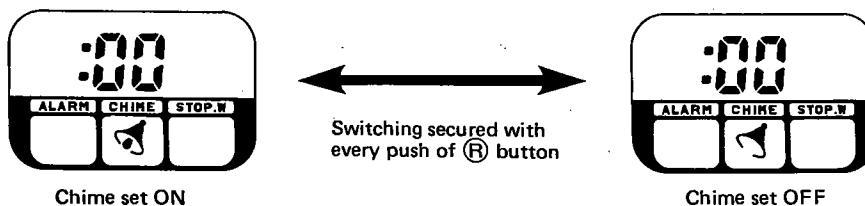
(b) The alarm ring can be stopped at any moment with push of either one of the buttons (S), (R), (M) and (L).

(4) When the normal time display is reset after setting the alarm, the mark " ⌚ " is displayed to indicate that the alarm is being set.

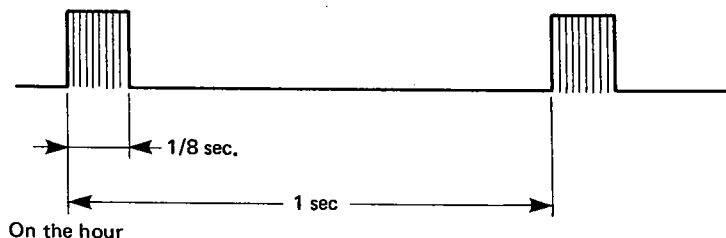
5) Chime function

With a push of (M) button in the mode of alarm time display, the chime display is secured.

(1) ON/OFF of chime setting



(2) Ring of chime (every hour on the hour)

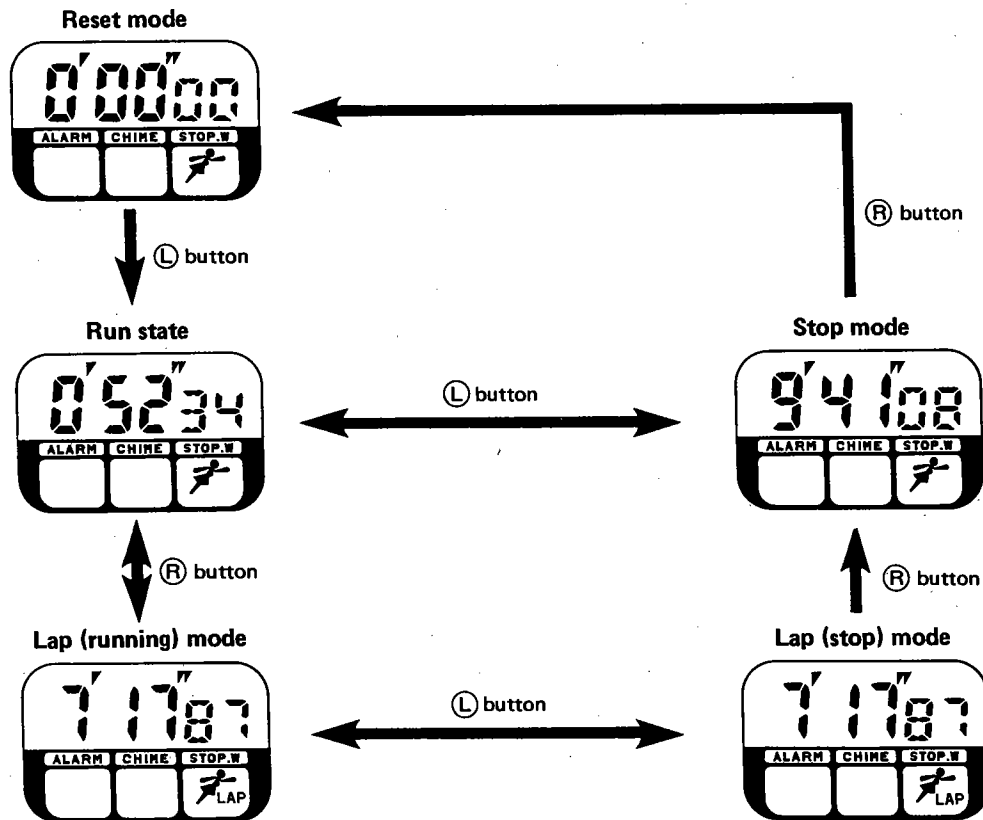


(a) When the chime is set ON, the ring sounds twice in long duration every hour on the hour.

(3) When the normal time display is reset after setting the chime ON, the mark " ⌚ " is displayed to indicate that the chime is being set.

6) Stopwatch function

With a push of (M) button in the mode of chime display, the stopwatch display is secured in either one of the five modes shown below. The setting procedure starts at the "reset" mode which is secured with push of (L) and (R) buttons.



(a) Reset mode

The display of 0'00"00 is given to indicate the preparatory state for clocking. And with push of (L) button, the clocking starts to secure the "run" mode.

(b) Run mode

The clocking is under way with the mark " ▾ " " " flashing.

(c) Stop mode

With push of (L) button in the "run" mode, the flashing of " ▾ " " " stopped to discontinue the clocking. And then with push of (R) button, the display is returned to the "reset" mode.

(d) Lap (running) mode

The part-way time can be known in this mode, along with the display discontinued but the clocking still continued each. In this case, " ▾ " " LAP" is flashing.

(e) Lap (stop) mode

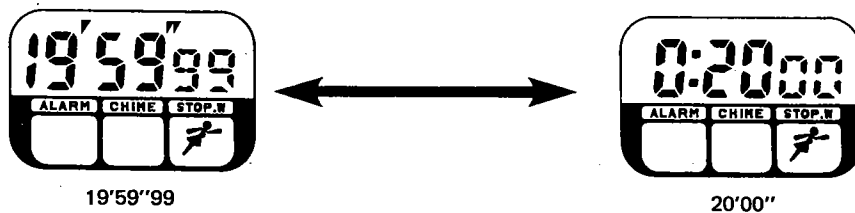
The time can be known for both the 1st and 2nd places in this mode which can be secured with push of (L) button in the "lap (running)" mode. And then with push of (R) button, the "stop" mode is secured to show the clocking value continued from the "run" mode.


In this case, " ▾ " " " has no flashing.



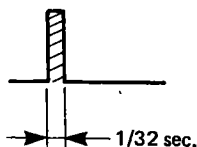
(1) Display transfer

The stopwatch display is given in "minute", "second" and "1/100 sec." during 00'00'00 ~ 19'59'99 and then in "hour", "minute" and "second" for 0:20 00 ~ 11:59 99 respectively.



(2) When the normal time display is reset in the "run" and "lap (running)" modes of the stopwatch display, the mark "  " is displayed to indicate that the clocking is under way.

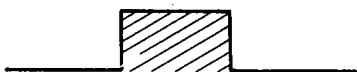
(3) The confirmation tone is heard in short duration with every push of (L) button. The tone is also heard at every start and stop.



Alarm monitor



With the simultaneous push of (L) and (R) buttons under the normal time display, the alarm ring can be confirmed via the tone of long duration. This tone continues as long as the both buttons are pushed.



## §5. TEST FUNCTION

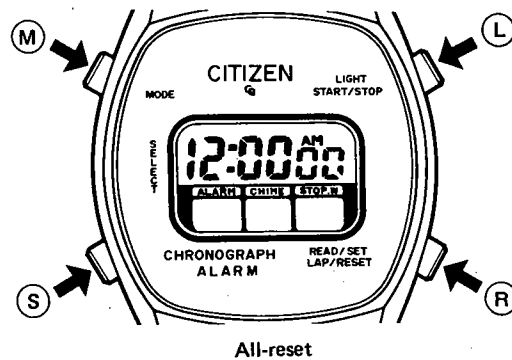
### 1) All-reset

The "all-reset" is applied with the simultaneous push of all push-buttons of (M), (S), (R) and (L) each.

#### •All-reset

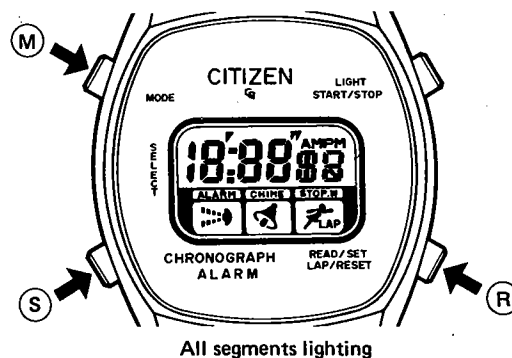
Display mode: Time display Time: 12.00'00" AM Calendar: Sunday, January 1, leap year set (0) Alarm: 12:00' AM, OFF Chime: OFF
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With release of either one of those buttons, the watch starts its function.



### 2) Lighting of all segments

With the simultaneous push of (S), (R) and (M) buttons each, the all segments glow.



## §6. NOTES ON MEASUREMENT OF TIME RATE

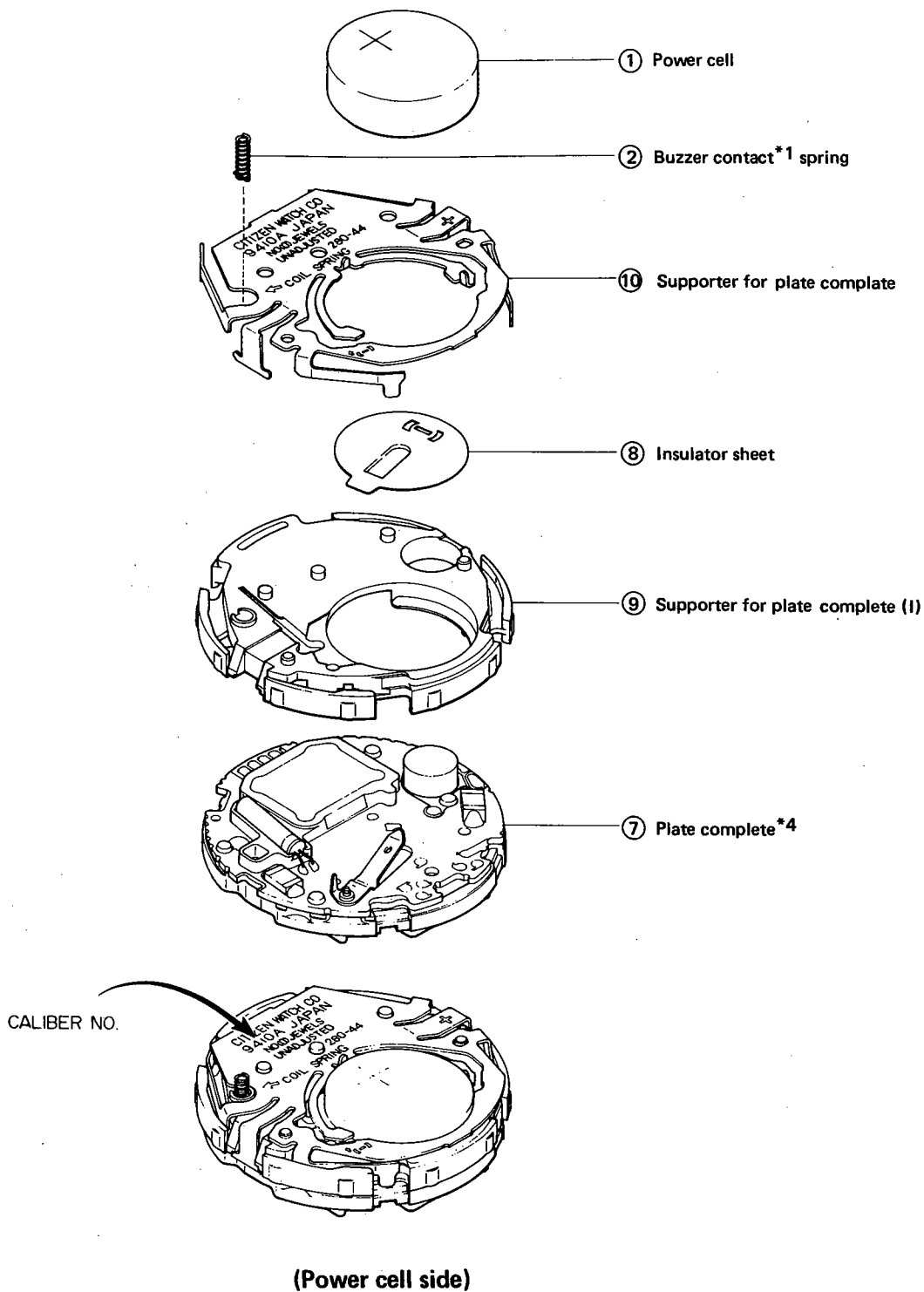
With this caliber, the time rate is not given usually at the market since the frequency control has already given at the factory in terms of the digital circuit.

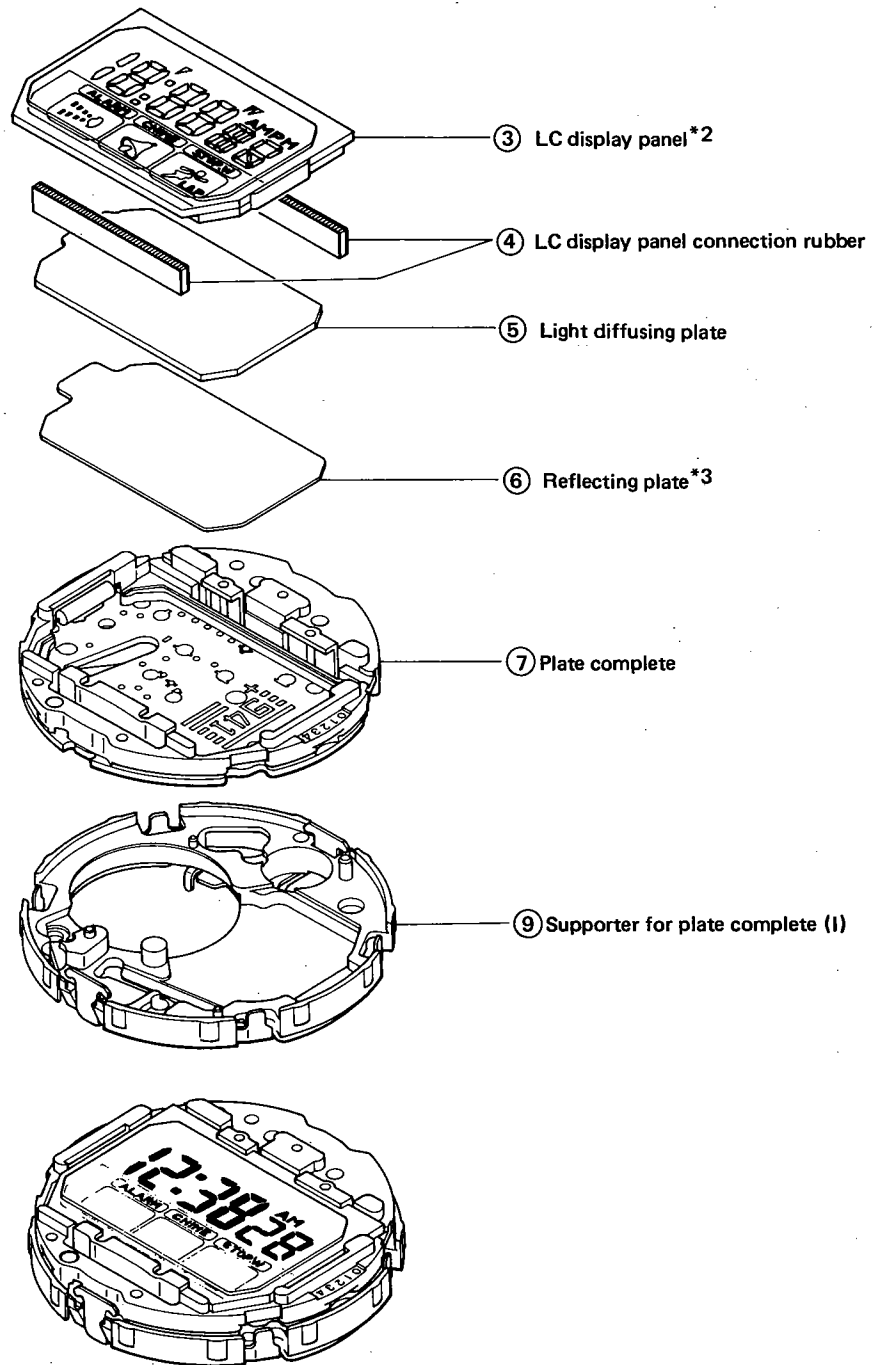
When measuring the time rate, the "MEASURE TIME" of the timing machine must be set to "10 sec." or its integer-fold value. This is based on the fact that the frequency control is given with every 10 seconds in the circuit. And thus the correct measurements cannot be obtained at the unit time other than "10 sec."

§7. DISASSEMBLING AND ASSEMBLING OF MODULE

Disassembling procedure: ① ~ ⑩  
 Assembling procedure: ⑩ ~ ①

For the notes (\*1 ~ 4) in the diagram, see the page 12 ~ 13.

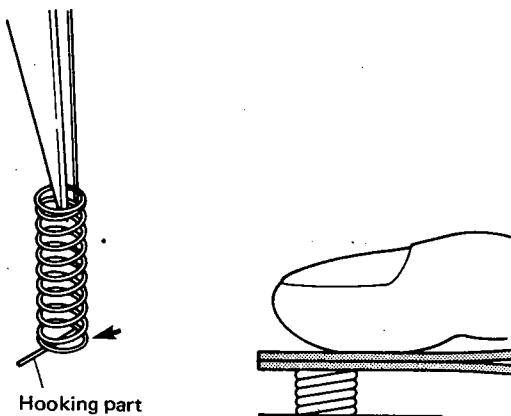




(LC display panel side)

●Notes on disassembling/assembling

\*1. Handling of buzzer contact spring



●Detachment

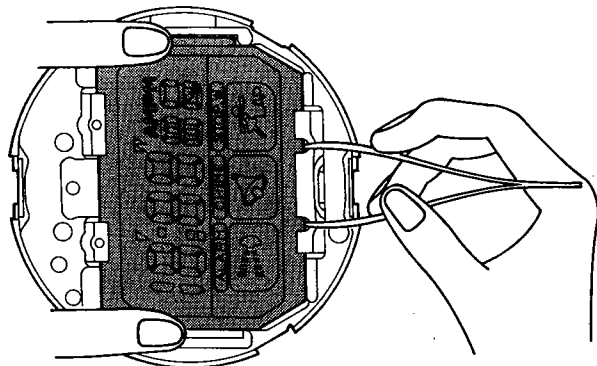
As illustrated left, the buzzer contact spring is held by the tweezers and then turned right and left with the soft pulling. Thus the spring can be removed.

●Attachment

As illustrated, the hooking part of the spring is set to the opposite side to the arrow mark. And then the spring is tilted to be pushed into the hole first at the hooking part.

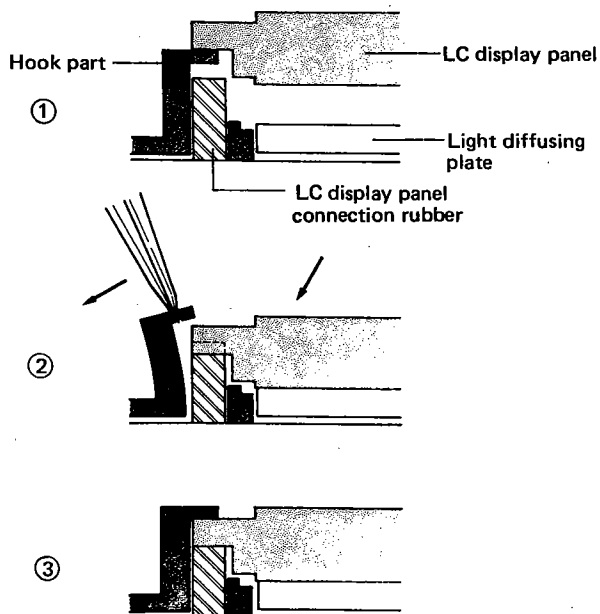
The spring must be pushed tight into the hole and turned. Never fail to make sure that the spring does not come off at all.

\*2. Handling of LC display panel  
(Disassembling)



As illustrated left, the hook part of the LC display panel supporter is shifted with the tweezers for disassembling and assembling. (This caliber applies the hook system with no use of screws.)

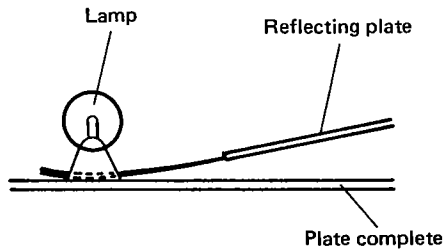
(Assembling)



When assembling, the hook part is put aside with the tweezers. And then the LC display panel set with pressure.

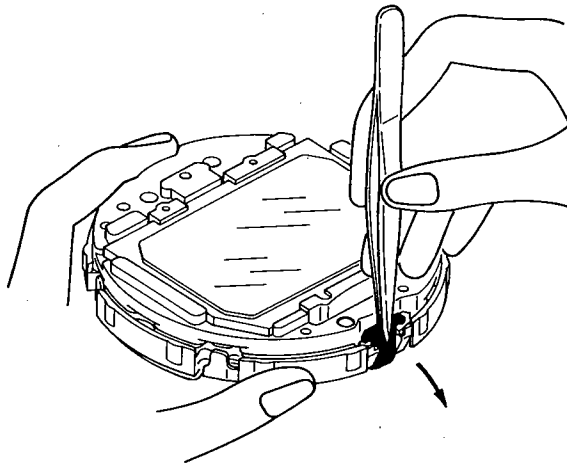
\*Both the disassembling and assembling must be carried out as quickly as possible since the hook part of the LC display panel supporter is deformed easily.

### \*3. Handling of reflecting plate



When setting the reflecting plate, the most outer circumference of the plate is held soft. And then the plate is slid under the lamp as illustrated left.

### \*4. Handling of plate complete



The plate complete is fixed to the supporter for plate complete (I) via the hook part of the supporter for plate complete (II).

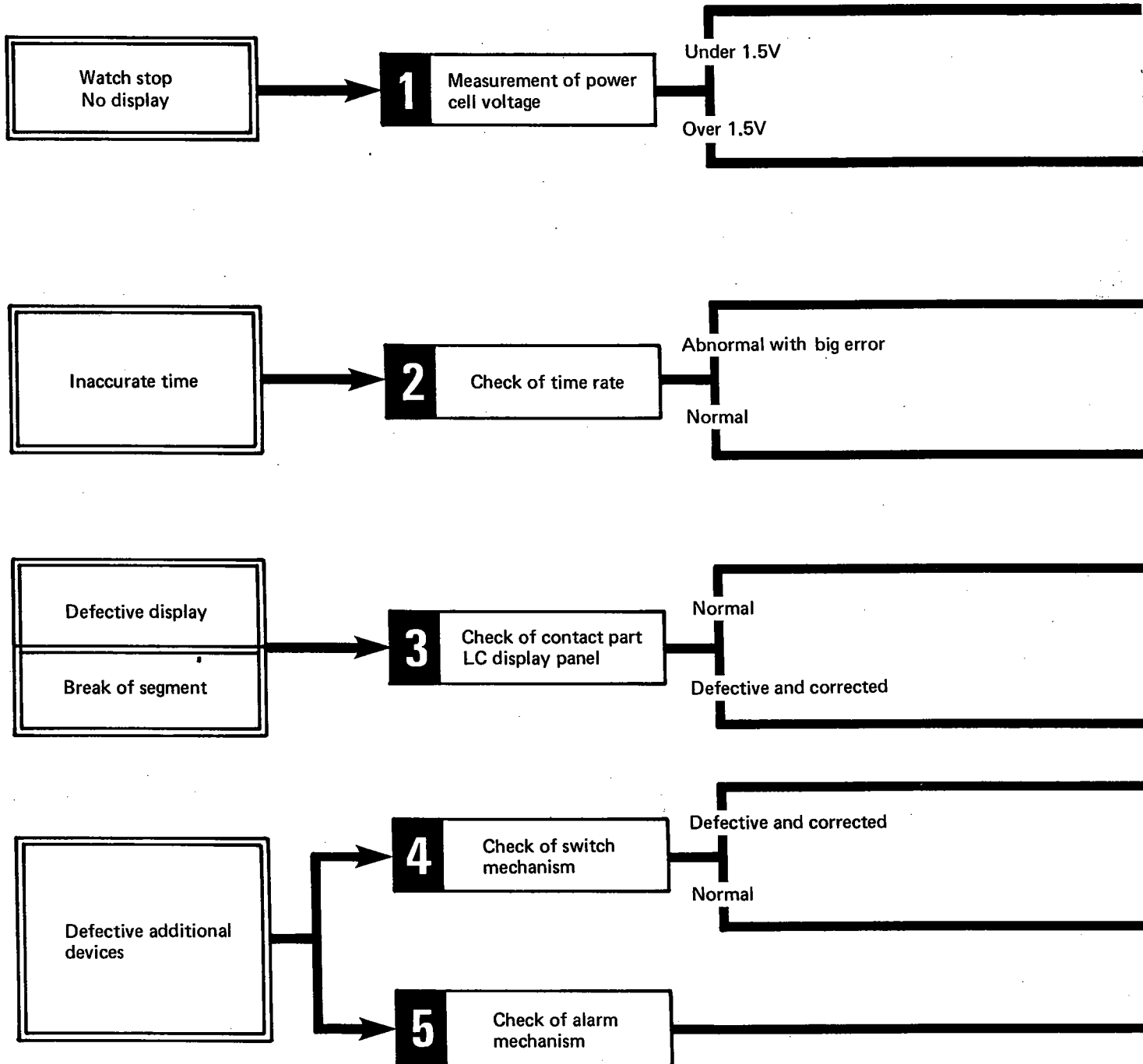
When disassembling and assembling, the hook part is opened with the tweezers or the like.

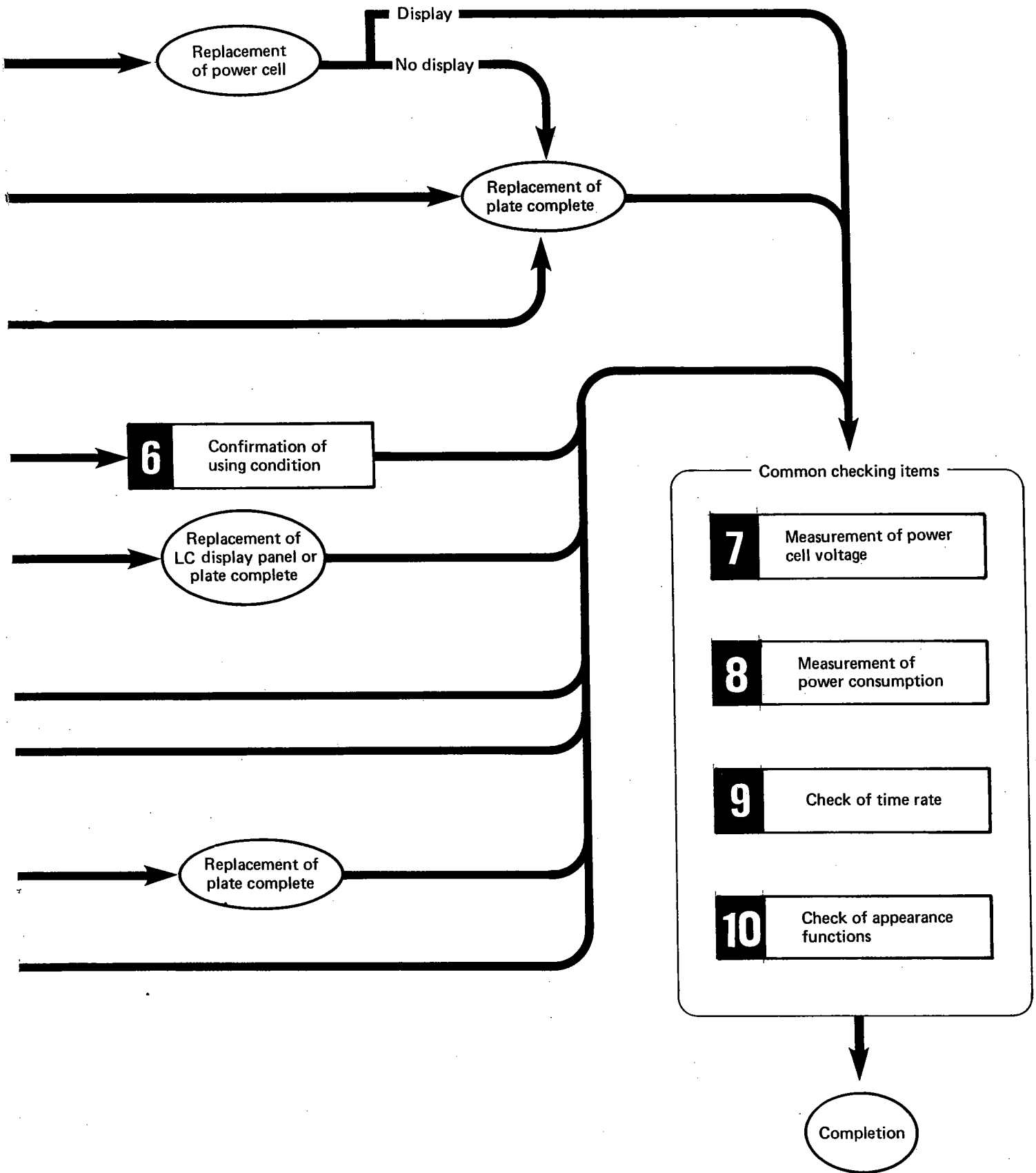
And when assembling, make sure that the hook part of the supporter for plate complete is engaged completely onto the substrate pattern of the plate complete.

\*The plate complete is unified with the LC display panel supporter into one body.

§8. TROUBLESHOOTING AND ADJUSTMENT

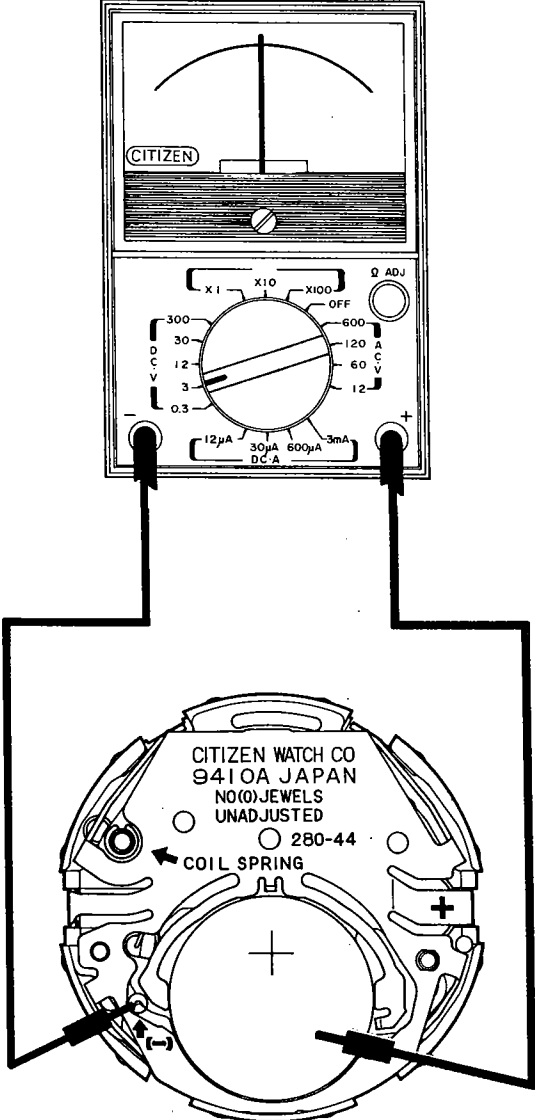
1) Flow chart of trouble shooting/adjustment

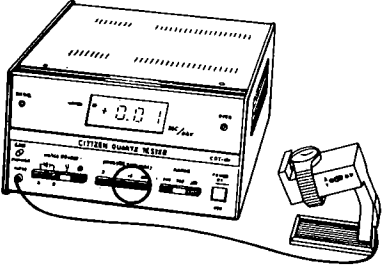

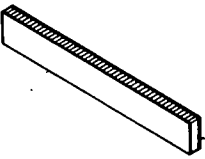


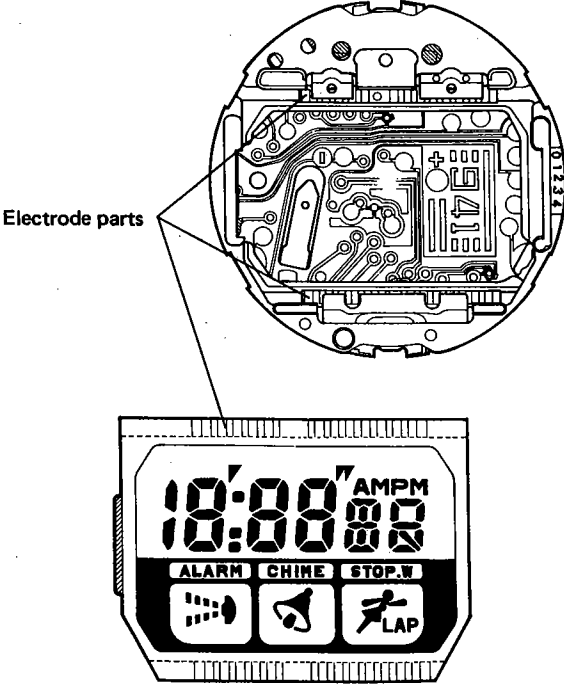


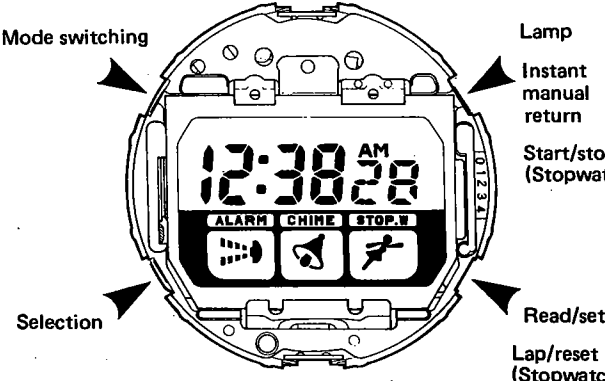



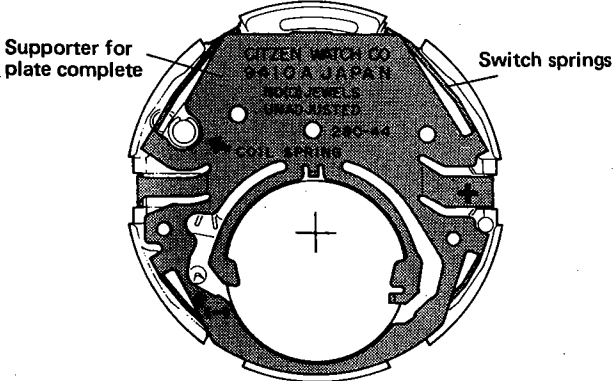
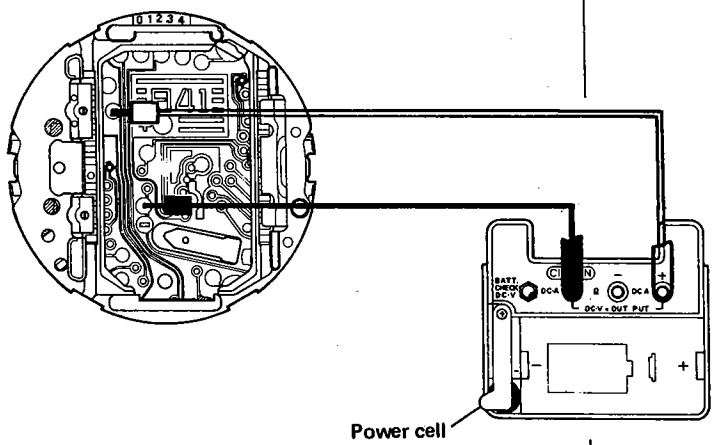
2) Details of troubleshooting/adjustment

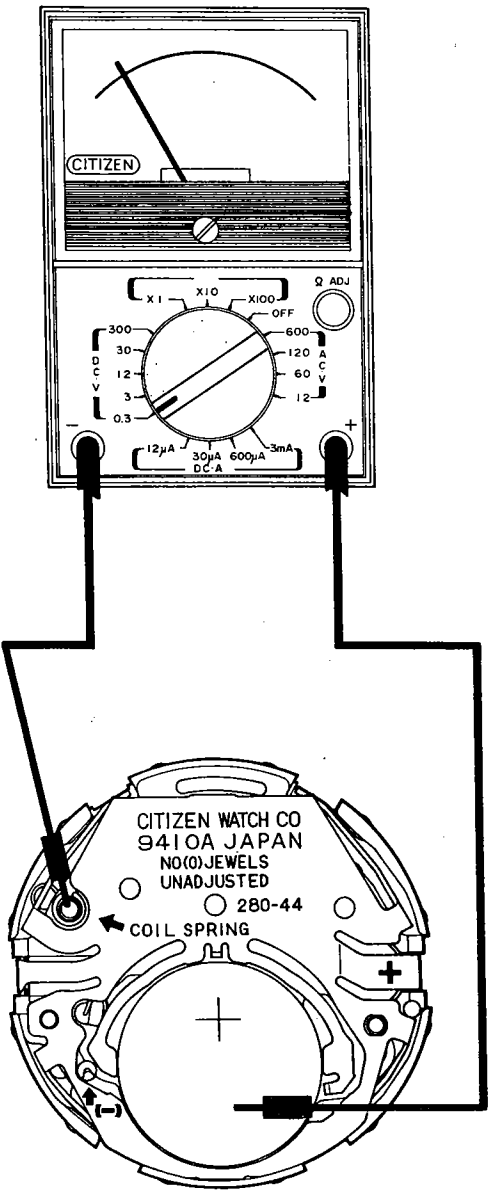
Check items	How to check	Result and treatment
<p>1 Measurement of power cell voltage</p>	<p>The measurement range of the tester is set to DCV3V.</p> <p>① The measurement is carried out by applying the black and red leads of the tester to the minus (-) terminal shown by the service mark on the supporter for plate complete (II) and onto the power cell respectively. Be careful not to have a contact between the black lead and the supporter for plate complete (II) featuring the plus (+) pole.</p> <p>② The measurement is given with power cell itself after removing it out of the movement.</p>  <p>In case the measurement of ① reads 0V or unsteady although the output of more than 1.5V is shown in ②, the defective contact is suspected between the power cell connector and the minus (-) side of the power cell. The dust or stains must be examined on the contact surface.</p>	<p><b>Over 1.5V</b></p> <ul style="list-style-type: none"> <li>• No display of LC display panel</li> <li>→ Replacement of plate complete</li> </ul> <p><b>Under 1.5V</b></p> <p>After replacement of power cell:</p> <ul style="list-style-type: none"> <li>• Display</li> <li>→ 7 Measurement of power consumption</li> <li>• No display</li> <li>→ Replacement of plate complete</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>In case the watch to be measured has been used more than two years, the power cell in the watch must be replaced with new one although the cell shows the output of 1.5V or more.</p> </div>

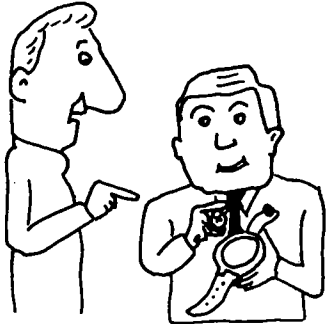
Check items	How to check	Result and treatment
<p>2 Check of time rate</p>	<p>The unit of measurement time must be set to "10 sec." or its integer-fold value.</p>  <p>If the measurement is carried out with the measurement time other than 10 sec., the time rate may be in correct.</p>	<p>Abnormal time rate with big error          → Replacement of plate complete</p> <p>Normal time rate          → 6 Confirmation of using condition</p>
<p>3 Check of contact part of LC display panel</p>	<p>The defective display such as break of segment or the like may be mainly caused by the incomplete contact at the contact part of the LC display panel. Thus the following points must be checked.</p> <p>① Check of hook parts of LC display panel supporter</p> <ul style="list-style-type: none"> <li>•Whether the hook parts are holding completely the LC display panel.</li> <li>•Whether the hook parts are worn out or deformed.</li> </ul>  <p>Hook parts</p> <p>② Check of LC display panel connection rubber</p> <ul style="list-style-type: none"> <li>•Whether the rubber is twisted or stretched out.</li> <li>•Whether some dust or stains stick to the rubber.</li> </ul>  <p>LC display panel connection rubber</p>	<p>Incomplete setting of hook parts          → To be corrected</p> <p>Hook parts worn out or deformed          → To be corrected</p> <p>•Correction impossible          → Replacement of plate complete</p> <p>Rubber twisted, worn out or stretched out          → To be replaced</p> <p>Dust or stains          → To be cleared away</p>

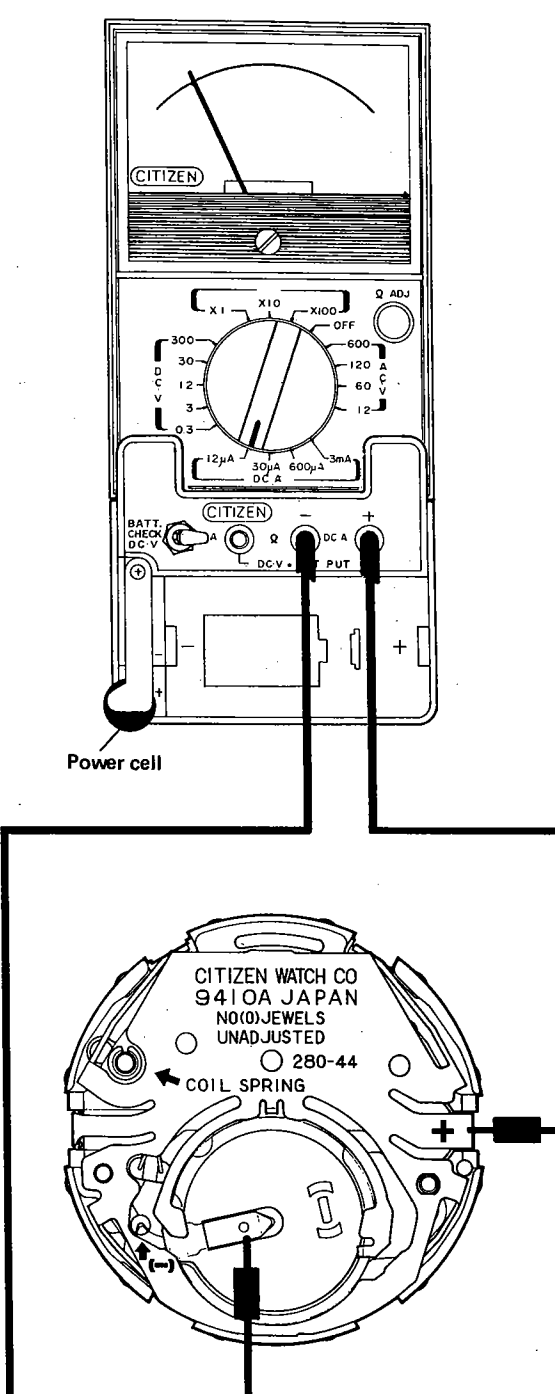
Check items	How to check	Result and treatment
	<ul style="list-style-type: none"> <li>● Whether some dust or stains stick to those electrode parts.</li> <li>● Whether those electrode parts have some crack or break.</li> </ul> <div style="text-align: center;">  <p>Electrode parts</p> </div>	<p>Dust or stains          → To be cleared away</p> <p>Electrode part cracked or broken          → Replacement of LC display panel</p> <p>No defect detected through above checking          → Replacement of LC display panel</p> <p>Correction impossible yet          → Replacement of plate complete</p>

Check items	How to check	Result and treatment
<p><b>4</b> Check of switch mechanism</p>	<p>① Check with movement Each switch is pressed with the tweezers or the like in the state of movement to check whether each function operates in a correct way.</p>  <p>② Check of push-buttons Make sure that each push-button has a smooth operation. If some defective operation is found, the push-button is removed out of the case for inspection. (The silicone oil must be supplied to the "O-ring" of each push-button.)</p> 	<p>Normal operation of switch mechanism → <b>2</b> Check of push-buttons</p> <p>Defective operation of switch mechanism → <b>3</b> Check of switch spring mechanism</p> <p>No lighting of illumination lamp → <b>4</b> Check of lamp</p> <p>Dust or stains on push-button → To be cleared away</p> <p>Push-button deformed or broken → To be replaced</p>

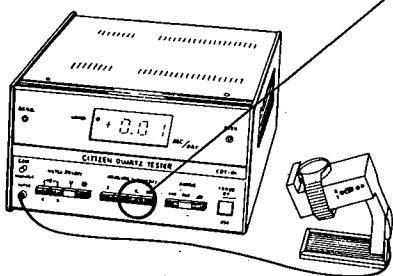
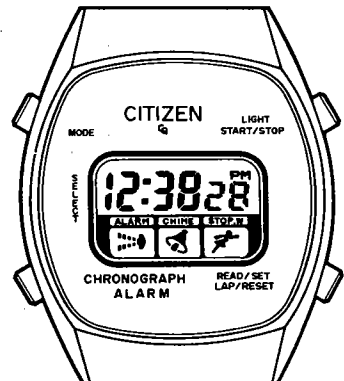
Check items	How to check	Result and treatment
	<p>③ Check of switch spring mechanism The switch springs of this watch are formed into a body with the supporter for plate complete.</p>  <p>● Whether each switch spring has some break or malformation. ● Each switch spring is pushed to check whether it has a correct contact with the pattern of the plate complete. * The position of switch spring may be shifted if the complete engagement is not secured between the supporter for plate complete and the plate complete.</p> <p>④ Check of lamp As illustrate below, the adaptor of the Citizen Multi-Tester is applied to the pattern of the plate complete to check whether the lamp glows or not.</p> 	<p>Switch spring deformed or broken → To be replaced</p> <p>No contact secured → To be corrected</p> <p>No defect detected through above checking → Replacement of plate complete</p> <p>No glowing of lamp → Replacement of plate complete</p>

Check items	How to check	Result and treatment
<p><b>5</b> Check of alarm mechanism</p>	<ul style="list-style-type: none"> <li>●Whether the buzzer contact spring has a correct contact to the piezoelectric element.</li> <li>●Whether the piezoelectric element has some crack or break.</li> <li>●Whether the buzzer contact spring is deformed, worn out or broken.</li> <li>●Whether some dust or stains stick to the contact part to the buzzer contact spring.</li> </ul> <p>Check by tester: The tester is set to the range of DCV0.3V. And the red and black leads are applied to the plus (+) side of the power cell and the buzzer contact spring. (In that moment, the alarm ring must be secured).</p> 	<p>No correct contact secured → To be corrected</p> <p>Crack or break given to element → Replacement of vibrating plate</p> <p>Spring deformed, broken or worn out → To be replaced</p> <p>Dust or stains → To be cleared away</p> <p>Tester needle swinging → Nondefective</p> <p>No swinging of tester needle → Replacement of plate complete</p>

Check items	How to check	Result and treatment
<b>6</b> Confirmation of using condition	<p>The following points are confirmed to the user of the watch.</p> <ol style="list-style-type: none"><li>1) Whether the watch has been handled in a wrong way.</li><li>2) Whether the watch has ever been used in the extreme temperature (outside the effective temperature range).</li><li>3) How many days have passed since the time was adjusted last?</li><li>4) And others.</li></ol> 	

Check items	How to check	Result and treatment
<p>7 Measurement of power cell voltage</p>	<p>Refer to <b>1</b>. The power cell must be replaced with new one when the measurements shows 1.5V or less.</p>	
<p>8 Measurement of power consumption</p>	<p>The power cell is put into the adaptor of the tester, and the snap switch is turned toward DCA along with the range set to <math>12\mu\text{A}</math> (DCA). Then the lead is applied as illustrated.</p> 	<p><b>Under <math>2.5\mu\text{A}</math></b> → Nondefective</p> <p><b>Over <math>2.5\mu\text{A}</math></b> → Measurement given with LC display panel removed</p> <p>And then:</p> <p><b>Under <math>2.0\mu\text{A}</math></b> → Replacement of LC display panel</p> <p><b>Over <math>2.0\mu\text{A}</math></b> → Replacement of plate complete</p>



Check items	How to check	Result and treatment
<p>9 Check of time rate</p>	<p>The unit of measurement time <u>must be set to "10 sec." or its integer-fold value.</u></p>  <p>The time rate may be incorrect if the measurement is carried out at the measurement time other than 10 sec.</p>	
<p>10 Check of appearance functions</p>	<p>At the final stage of checking, the appearance functions are checked as follows.</p> <ul style="list-style-type: none"> <li>●Whether each operation is possible in a correct and smooth way.</li> <li>●Whether the display is given in the normal state.</li> <li>●Whether function area is free from the dust or stains.</li> <li>●And others.</li> </ul> 	

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