

***TECHNICAL  
INFORMATION***

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**CITIZEN QUARTZ**

**Cal. No. 960※**

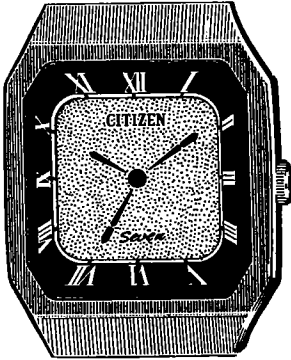
 **CITIZEN**

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## ■1. OUTLINE



This is a digital quartz watch for ladies, featuring an analog display with three hands. It incorporates the alarm and chime functions in addition to the LCD (liquid crystal display) function of time. The handling is easy and simple just through the operation of a crown. A beautiful design of this watch will fully meet the contemporary needs of ladies' fashion.

## ■2. FEATURES

- 1) Analog LCD  
The analog LCD method with three hands enhances the fashion quality of this watch regardless of its multi-function system.
  - 2) Simple operation by crown  
Just a single crown can perform all operations of this watch. This enhances not only the operability but the fashion quality of the watch appearance.
  - 3) Melody alarm  
The alarm gives a melody with soft tone owing to the adaption of an envelope circuit.\*
  - 4) Lifetime of about 2 years for power cell  
A long lifetime of about 2 years is attained for the power cell in spite of a small-size module.
- \* Envelope circuit  
This circuit functions to gradually attenuate the output sound of alarm. The envelope circuit of this caliber is different from that of Cal. No. 24-series in terms of the system. The alarm tone of this caliber is attenuated in 7 steps.

■3. SPECIFICATIONS

Caliber No.	9600-00	
Type	Digital quartz watch with 3 hands (LCD)	
Size of module (mm)	17.0 (3-9h) x 18.0 (12-6h) x 21.0φ Thickness: 3.65 <sup>t</sup> (Power cell part 3.90 <sup>t</sup> )	
Accuracy	±20 sec./month at normal temperature	
Oscillation	32,768Hz	
Method of display	FE-type nematic LC (liquid crystal) 3-split multiplex driving (Analog display of LC)	
Integrated circuit	C/MOS-LSI (1 unit)	
Effective temperature range	±0°C ~ +55°C (32°F ~ 131°F)	
Adjustment of time rate	By trimmer condenser	
Display functions	Time	Hour, minute and second*1)
	Alarm	ON : Set time shown in hour and minute*2) OFF : Display of "OFF" mark
	Chime	ON : Display of pattern OFF : Display of "OFF" mark
Additional functions	Alarm monitor*3) Auto-return system	
Power cell (Silver oxide)	Parts No. : 280-53 (1 unit) Maker code : SR721W, Ag <sub>2</sub> O/KOH, maxell) Size (mm) : 7.8φ x 2.15 <sup>t</sup> Nominal voltage : 1.55V Nominal capacity : 25mAH Lifetime : About 2 years (20 sec. alarm and 12 hourly chimes per day)	
Remarks	●Only the control codes are shown for the difference of colors (silver and gold) of the unfigured reflecting plates.	

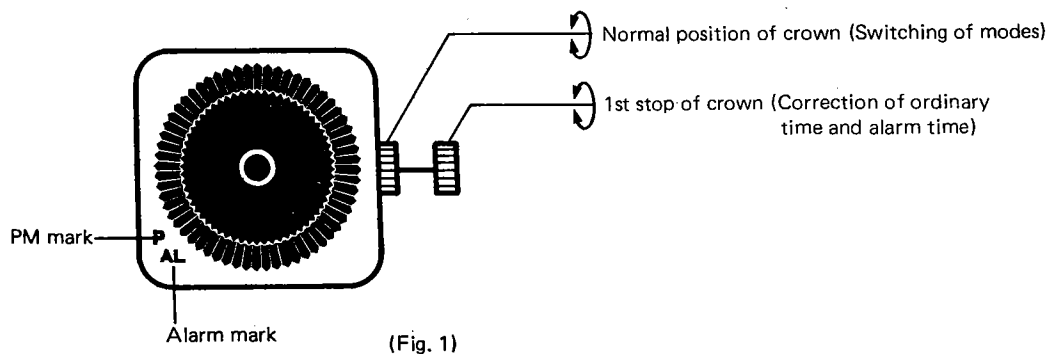
\*1) The "P" mark is shown to indicate PM during a correction of time.

\*2) The "P" mark is shown to indicate PM.

\*3) A pattern is shown during the alarm monitor.

#### ■4. HANDLING INSTRUCTIONS (The mark ○ shows flashing.)

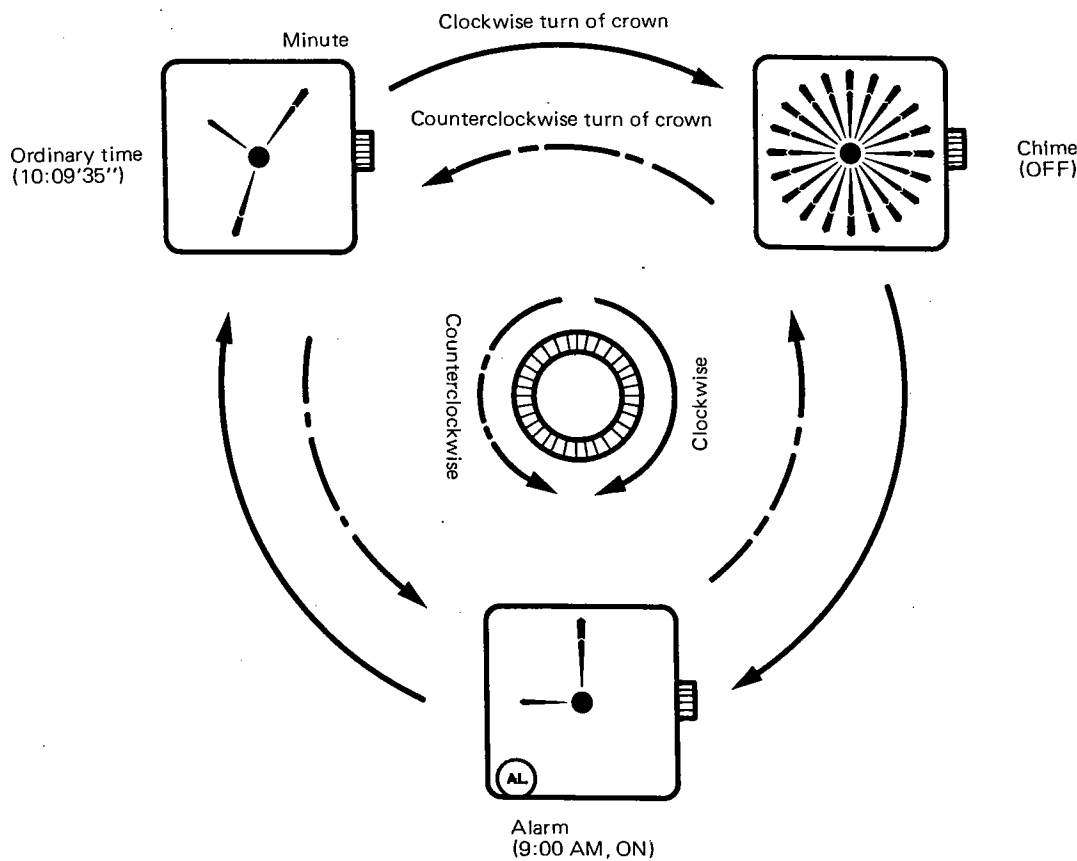
##### 4-1. Appearance and nomenclature



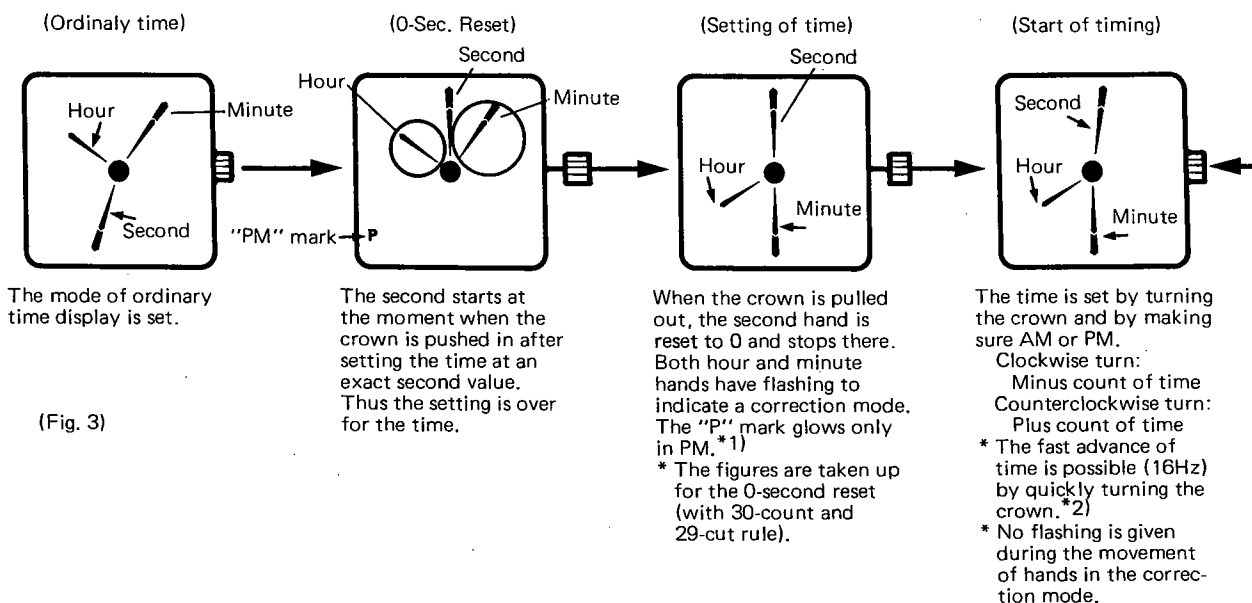
##### 4-2. Switching of modes

As shown in Fig. 2, the modes of display are switched by turning the crown at its normal position.

- No operation is given at the first turning click of the crown for the purpose of preventing the malfunctioning. The switching of modes is possible at and after the second click.
- The display of ordinary time is automatically reset in 2 ~ 3 minutes under the alarm or chime mode. (Auto-return system)



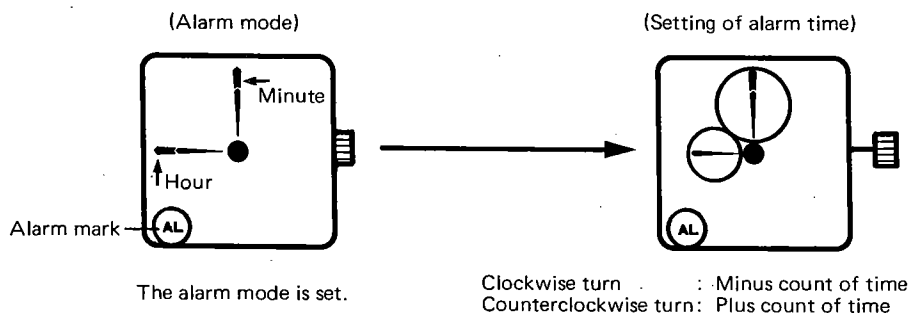
### 4-3. Correction of time



(Fig. 3)

- \*1) No mark is provided to indicate AM, i.e., the glowing of "P" mark indicates PM and no glowing of "P" mark indicates AM respectively.
- \*2) The fast advance of time discontinues once when the time equivalent to an hour is advanced. If you want to stop the fast advance of time midway, turn the crown counterclockwise by one click.

### 4-4. Correction of alarm time



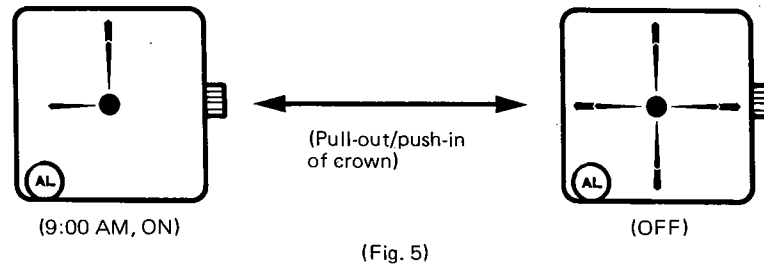
(Fig. 4)

Then the crown is pulled out, both hour and minute hands have flashing. An alarm time is set by turning the crown in the same way as that for the correction of ordinary time and by making sure AM or PM. The crown is pushed into its normal position to complete the setting of alarm time.

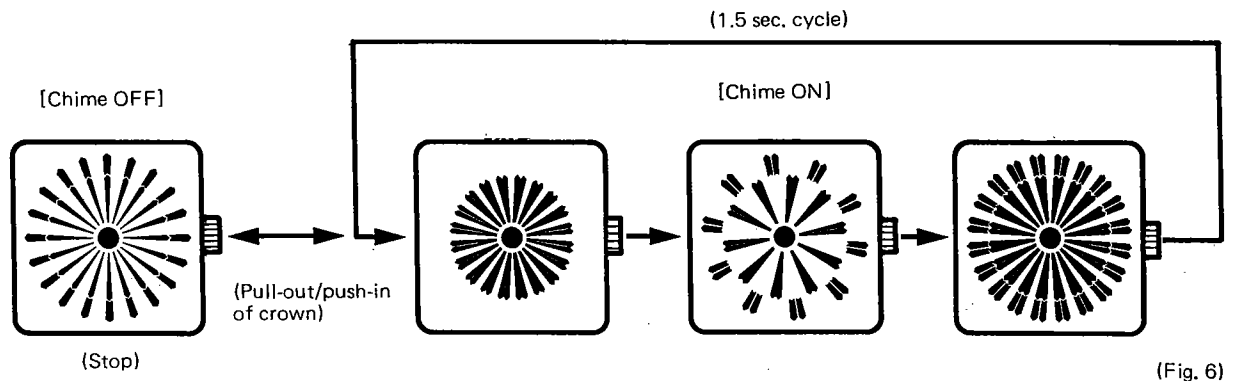
- No time is displayed at first in the alarm OFF mode, and the time previously set is shown when the crown is pulled out.
- The fast advance of time (16Hz) is possible by quickly turning the crown.
- No flashing is given during the movement of hands in the correction mode.

#### 4-5. Alarm ON/OFF

As shown in the diagrams below, the alarm function is switched on and off by pulling out and pushing in the crown with no turning.



#### 4-6. Chime ON/OFF



The chime mode is turned on and off by pulling out and pushing in the crown respectively.

The display stands still in the OFF mode, and three different patterns are displayed in the ON mode in a cycle of 1.5 seconds (0.5 sec. each).

- When the crown is pulled out, the alarm monitor mode is set to display patterns regardless of ON or OFF of the chime mode.

#### 4-7. Alarm monitor

The monitor is possible for the chime tone when the crown is pulled out in the chime mode. In this case, the patterns are displayed as shown in Fig. 6.

#### 4-8. Stopping alarm ringing

The alarm ringing is stopped by turning the crown. (The alarm rings 20 seconds.)

5. DISASSEMBLY/ASSEMBLY OF MODULE WITH LUBRICATION

5-1. Disassembling/Assembling procedure

Mark of lubrication:

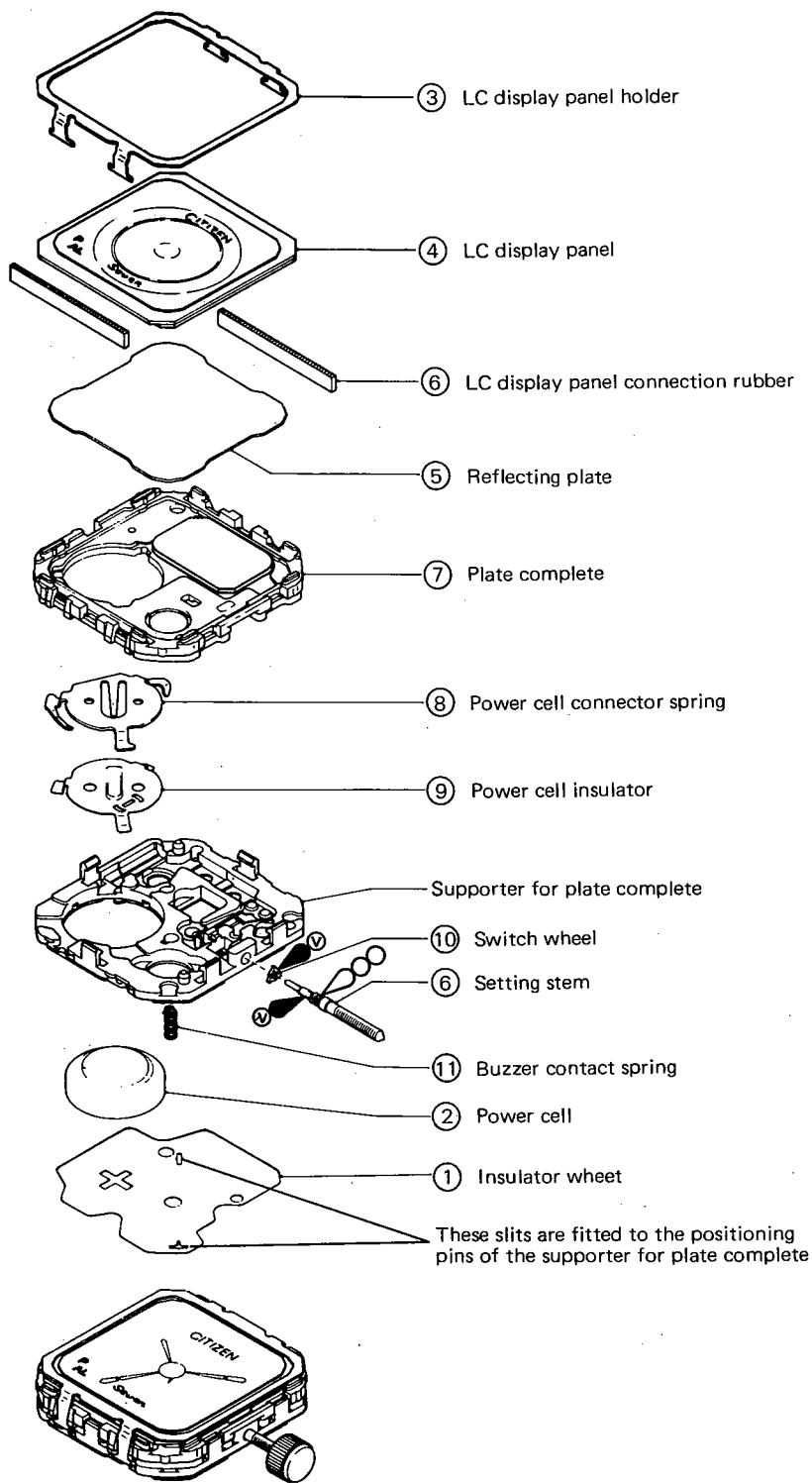
④ V-Lube oil

① CH-1 oil

Disassembling procedure: ① → ⑪

Assembling procedure: ⑩ → ①

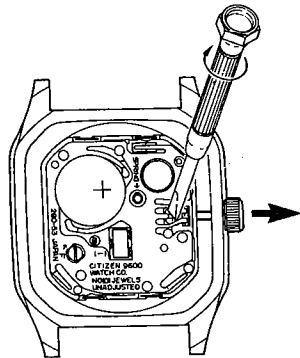
\* The buzzer contact spring is set after the power cell.





## 5-2. Notes on disassembly/assembly and lubrication

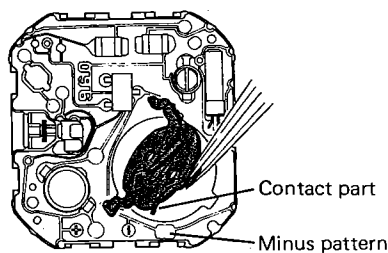
### 1) Setting/unsetting of setting stem



As illustrated left, a rather thick driver is put into the fork part of a supporter for plate complete and pried to open wide the fork part. Then the setting stem is pulled out.

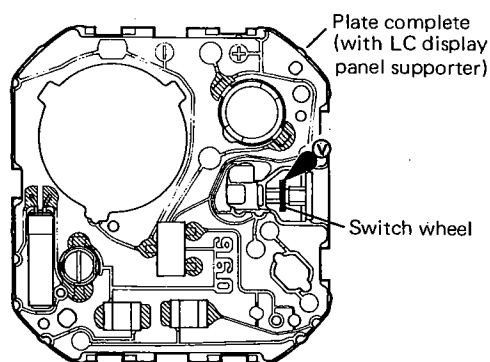
When attaching the setting stem, turn the setting stem slightly to ensure the good engagement with a switch wheel.

### 2) Setting of power cell connector spring



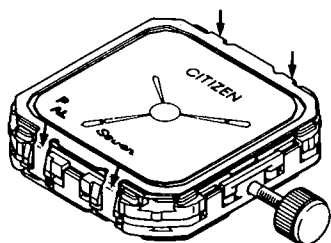
The contact part of the power cell connector spring must touch the minus pattern of the circuit.

### 3) Lubrication to switch wheel



The switch wheel is set into the LC display panel supporter which is called to the plate complete. Then the V-Lube oil is supplied to the switch wheel. With this procedure of lubrication, the switch wheel can be prevented from flying out during the assembly of module.

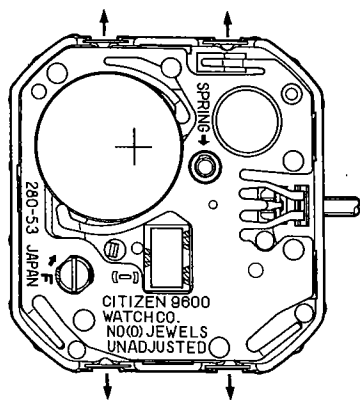
### 4) Setting of LC display panel holder



The assured hooking must be secured for the LC display panel holder by pressing light the shoulder areas of 4 hook parts of the holder with use of a tweezers or the like.

When setting the LC display panel holder, be careful of the degree of parallel hooking. The unparallel and forcible hooking will break the electrode part of the LC display panel.

5) How to unset hook part

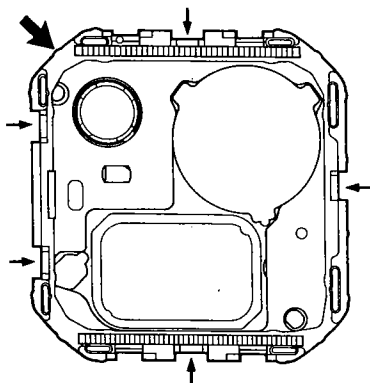


a) Hook part of LC display panel holder  
The 4 hook parts (indicated by arrows in the left diagram) are shunted light.

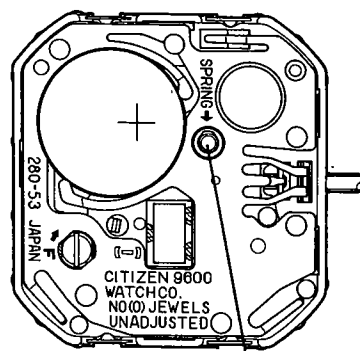
b) Hook part of supporter for plate complete  
The left diagram shows a plate complete, and the hook parts of a supporter for plate complete are fitted to the arrow-indicated parts of the plate complete respectively.

Be careful of a malformation of these hook parts since they are made of plastic.

The fitting of the supporter for plate complete is rather tight to the plate complete at a corner of the boosting coil side. Thus the area indicated by a thick arrow mark is pried light between the plate complete and the supporter for plate complete for disassembly.



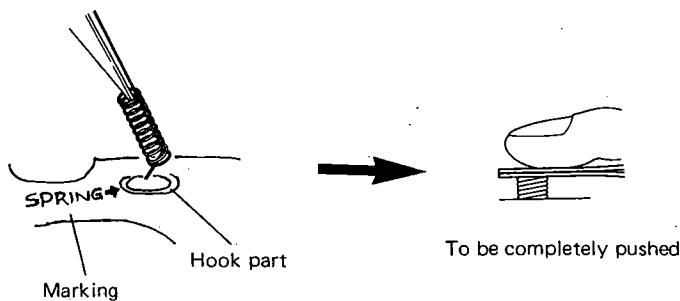
6) Setting of buzzer contact spring



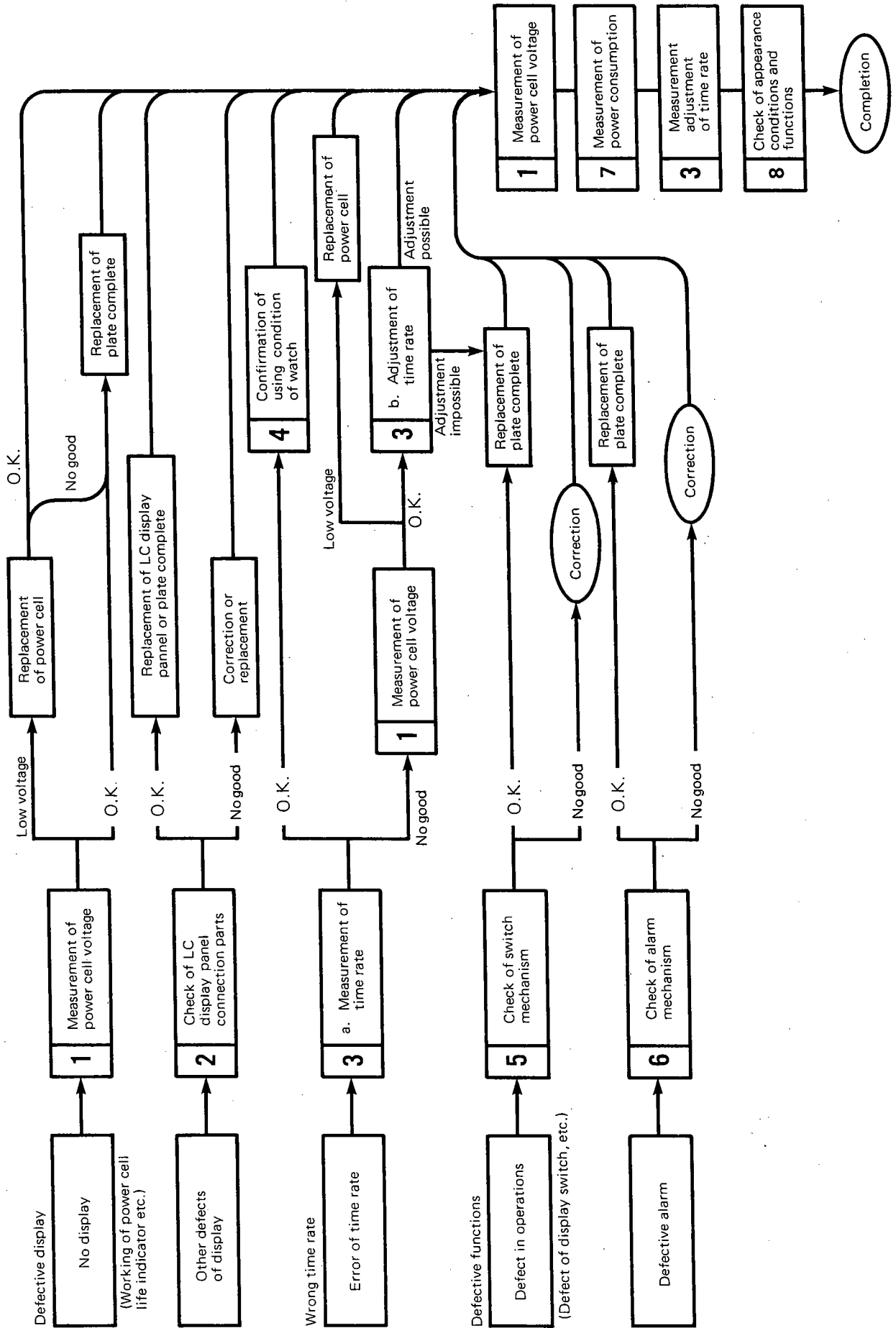
Position of setting

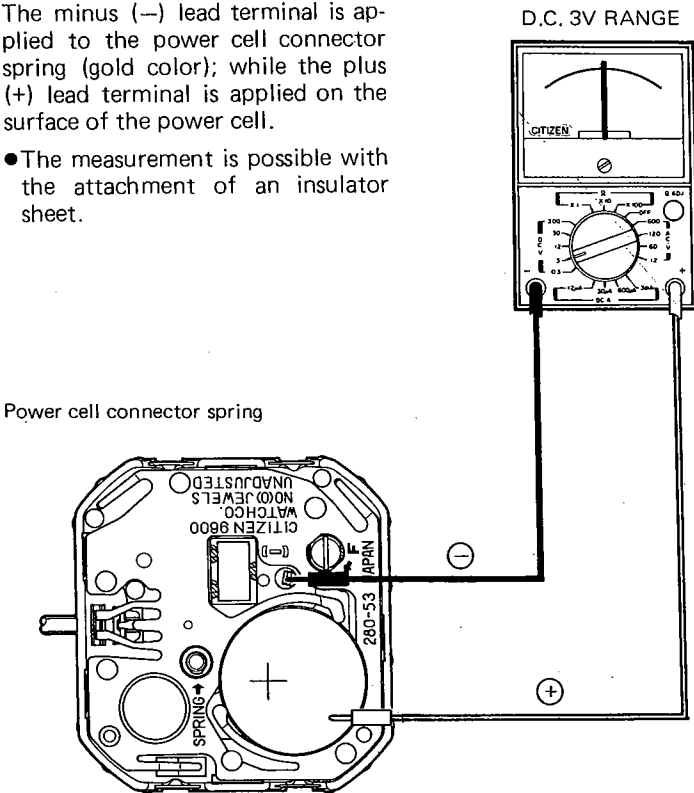
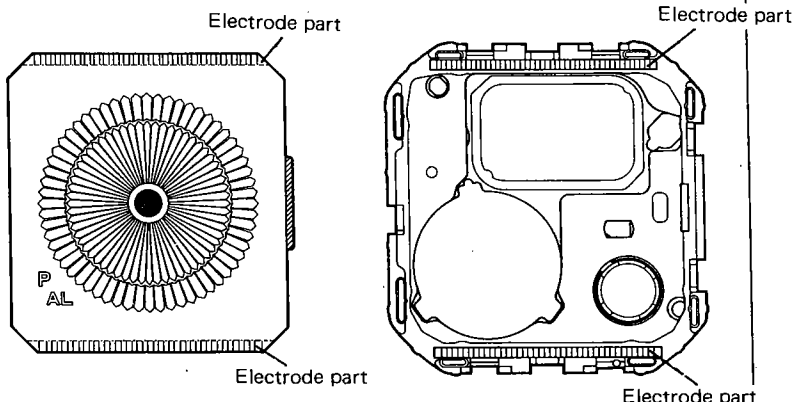
The buzzer contact spring is set after the assembly of the module.

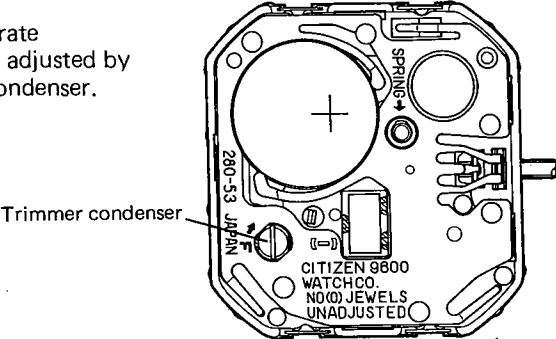
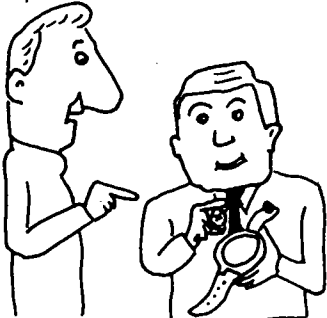
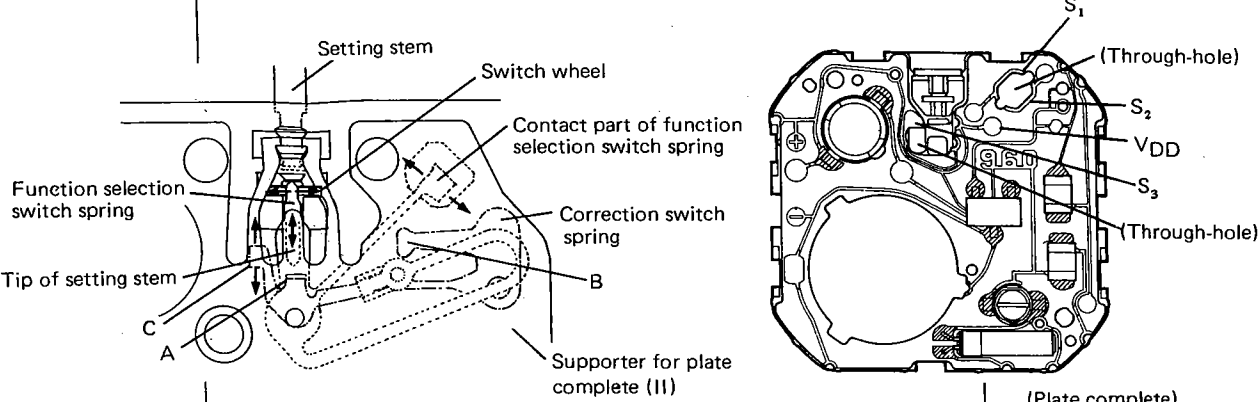


The hook part of the buzzer contact spring is turned toward the marking "SPRING →" on the supporter for plate complete. Then the contact spring is pushed rather obliquely into a hole of the supporter for plate complete.

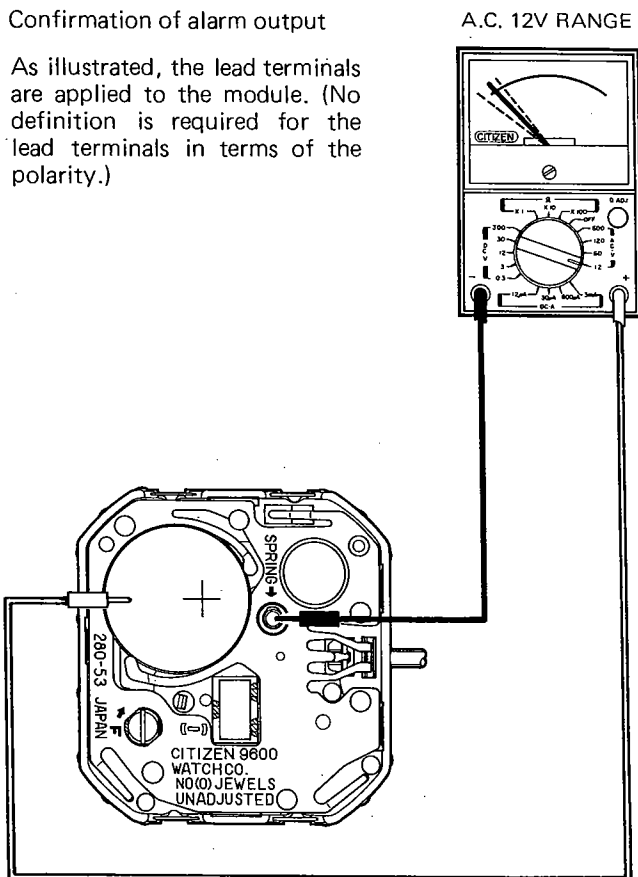
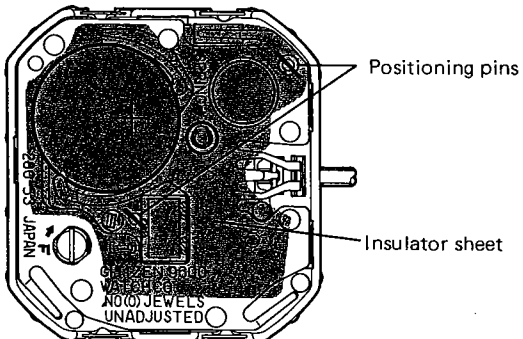


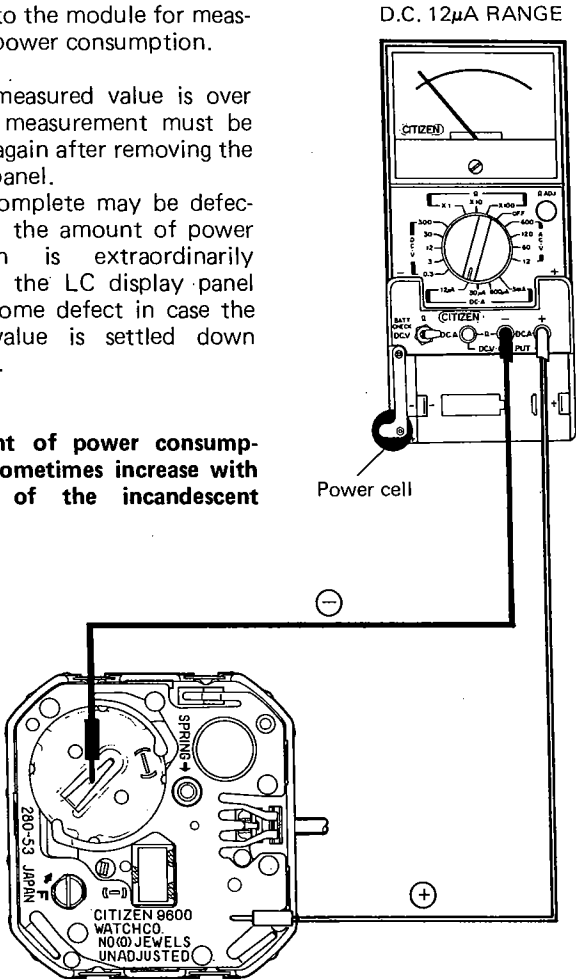
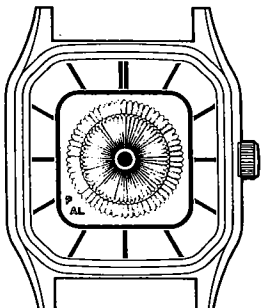
6. TROUBLE SHOOTING AND ADJUSTMENT



Checking items	How to check	Results and treatment
<p>1 Measurement of power cell voltage</p>	<p>The minus (−) lead terminal is applied to the power cell connector spring (gold color); while the plus (+) lead terminal is applied on the surface of the power cell.</p> <ul style="list-style-type: none"> <li>• The measurement is possible with the attachment of an insulator sheet.</li> </ul> <p style="text-align: right;">D.C. 3V RANGE</p>  <p>Power cell connector spring</p>	<p><b>Over 1.5V</b> → Normal</p> <p><b>Under 1.5V</b> → Replacement of power cell</p>
<p>2 Check of connection part of LC display panel</p>	<p>Make sure that the electrode parts of the LC display panel are free from any crack or break. The particular care must be paid to the breakage of the electrode parts since the upper and lower glass plates of this caliber's LC display panel is very small in thickness, i.e., just <math>300\mu</math> each (<math>610\mu</math> in total thickness).</p> <p>Check the exfoliation or the like of the pattern for the electrode part of the plate complete side. At the same time, be careful of the falldown of the LC display panel connection rubber which is caused by the incomplete setting.</p> <p>The dust or stains sticking at the area between the electrodes must be completely cleared off.</p> 	

Checking items	How to check	Results and treatment
<p><b>3</b> Measurement and adjustment of time rate</p>	<p>a) Measurement of time rate The measurement of time rate is rather hard owing to the 3-split multiplex drive system. The measurement will be comparatively stable by setting the unit time of measurement at "10 sec." and in the <b>chime mode</b>.</p> <p>b) Adjustment of time rate The time rate can be adjusted by turning a trimmer condenser.</p> 	
<p><b>4</b> Confirmation of using condition of watch</p> 	<p>The following points are checked with the user of the watch.</p> <ol style="list-style-type: none"> <li>1) Whether or not the watch was used in a wrong way.</li> <li>2) Whether or not the watch was used outside its effective temperature range.</li> <li>3) How many days have passed since the last adjustment of time rate?</li> <li>4) And others.</li> </ol>	
<p><b>5</b> Check of switch mechanism</p>	<ul style="list-style-type: none"> <li>• The switch wheel turns with the turn of the crown and flips the function selection switch spring right and left. As a result, the contact part of the switch spring moves as shown by the arrows and touches patterns <math>S_1</math> and <math>S_2</math> on the plate complete to perform a switching action.</li> <li>• The tip of the setting stem presses part A of the correction switch spring with the pull-out and push-in of the crown. As a result, part C moves as shown by the arrows and touches the switch pattern <math>S_3</math> on the plate complete to perform a switching action. The part B falls to the pattern <math>V_{DD}</math> of the plate complete.</li> </ul> 	<p>Note:</p> <p>Motion of function selection switch spring   Shown by broken line</p> <p>Motion of correction switch spring   Shown by 1-dot chain line</p>
	<p>The above working can be confirmed with the LC display panel and the reflecting plate removed. If the springs have some defect, the supporter for plate complete must be replaced since these springs are assembled into the plate complete.</p>	

Checking items	How to check	Results and treatment
<p>6 Check of alarm mechanism</p>	<p>a) Confirmation of alarm output</p> <p>A.C. 12V RANGE</p> <p>As illustrated, the lead terminals are applied to the module. (No definition is required for the lead terminals in terms of the polarity.)</p>  <p>The alarm monitor in the chime mode is utilized for the alarm output of this case.</p> <p>b) Check of insulator sheet</p> <p>The insulator sheet must set in a correct way by means of two positioning pins. If the insulator sheet is set in a defective way, a short circuit will be caused between the plus (+) side of power cell and a piezoelectric element. This will cause the defective ringing of alarm.</p> 	<p>Meter needle swinging in a range of 0 ~ 0.7V</p> <p>→ Normal</p>

Checking items	How to check	Results and treatment
<p>7 Measurement of power consumption</p>	<p>As illustrated, the lead terminals are applied to the module for measurement of power consumption.</p> <p>When the measured value is over <math>1.2\mu\text{A}</math>, the measurement must be carried out again after removing the LC display panel. The plate complete may be defective in case the amount of power consumption is extraordinarily large; while the LC display panel may have some defect in case the measured value is settled down respectively.</p> <p><b>Caution.</b> The amount of power consumption may sometimes increase with irradiation of the incandescent lamp light.</p> 	<p><b>Under <math>1.2\mu\text{A}</math></b></p> <p>→ Normal</p>
<p>8 Check of appearance and functions</p>	<ul style="list-style-type: none"> <li>• Make sure that no break of segment exists through a full-segment glow test.*</li> <li>• Make sure that the alarm monitor function works in a correct and complete way.</li> <li>• Make sure that the external appearance and the operability of each function are nondefective.</li> </ul> <p>* Full-segment glow test The full segments will glow, if nondefective, by pulling out and then quickly turning the crown right and left in the alarm monitor mode. The mode of this test is cancelled when the crown is pushed into its normal position.</p> 	

**CITIZEN WATCH CO., LTD.**

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