

***TECHNICAL  
INFORMATION***

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**CITIZEN QUARTZ**

**Cal. No. 951❖❖**

 **CITIZEN**

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■1. Outline






This is a digital quartz watch for men, which is developed on the basis of the precedent Cal. No. 9460. It features a wide variation of designs to be one of the Citizen's prime digital watches with reasonable prices.

■2. FEATURES

- 1) The stopwatch function is capable of displaying 1/100 sec. timing and LAP timing up to 59'59''99.
- 2) The switching is independently possible between the 12-hour display with AM/PM and the 24-hour display and in the ordinary time display mode and the dual time display mode respectively.
- 3) DFC (Digital Frequency Control) system  
This caliber applies the DFC system in which the time rate is perfectly adjusted at the factory. Accordingly, no adjustment is carried out for the time rate on the market.
- 4) A long lifetime of about 6 years (3 sec. lighting of illumination lamp per day) is attained with use of a lithium power cell.
- 5) The push-buttons are provided at both sides of a case or at the single side plus on the upper face of a case respectively according to each watch. (See page 8.)  
The module is, however, equal between these two types of watches having different positions of push-buttons. (See page 8.)

### ■3. SPECIFICATIONS

Caliber No.		9510A	
Movement		Size	: 27φmm
		Thickness	: 4.98mm (incl. power cell part)
Accuracy		±20 sec./month at normal temperatures	
Oscillation		32,768Hz	
Method of display		FE (Field Effect) type nematic LC (Liquid Crystal) with 2-split matrix driving	
Display functions	Upper display part	Ordinary display	Upper : Displays to be switched by selection of functions Middle : Constant display of month, date & day Lower : Constant display of hour, minute & second (12-hour display)  Constant display of hour, minute, second & 24H (24-hour display)
		Calendar	Constant display: Month, date & day In correction mode: A/P display (12-hour display) plus year display at lower side
		Stop watch	 , minute, second & 1/100 sec. with lap function
		Dual time	 , hour, minute & A/P (12-hour display)  , hour and minute (24-hour display)
Correction of display		With operation of push-buttons	
Effective temperature range		±0°C ~ 55°C (32°F ~ 131°F)	
Integrated circuit		C/MOS-LSI (1 unit)	
Additional functions		<ul style="list-style-type: none"> <li>● Quick advance of time in correction mode</li> <li>● Illumination lamp</li> <li>● Fully automatic calendar (1980 ~ 2019)</li> <li>● Auto-return mechanism</li> <li>● Instant manual return mechanism</li> </ul>	
Power cell (Lithium)		Parts No.	: 280-204
		Maker code	: CR2016 (Li/MnO <sub>2</sub> )
		Nominal voltage:	3V
		Capacity	: 55mAH
		Size	: 20φmm x 1.6mm
		Lifetime	: About 6 years (3 sec. lighting of illumination lamp per day)

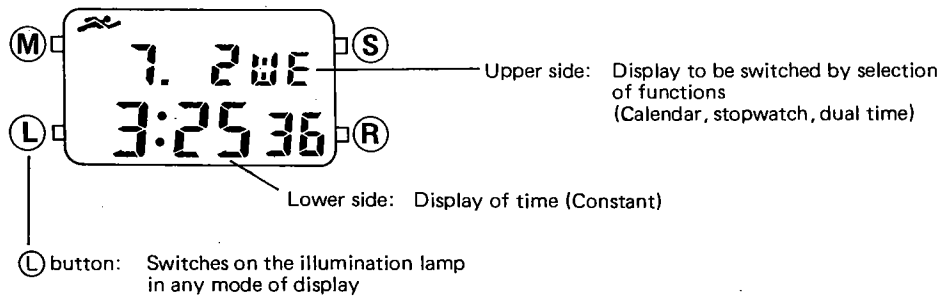
4. HANDLING INSTRUCTIONS

(A circle mark ○ shows the flashing.)

1) Name of each part

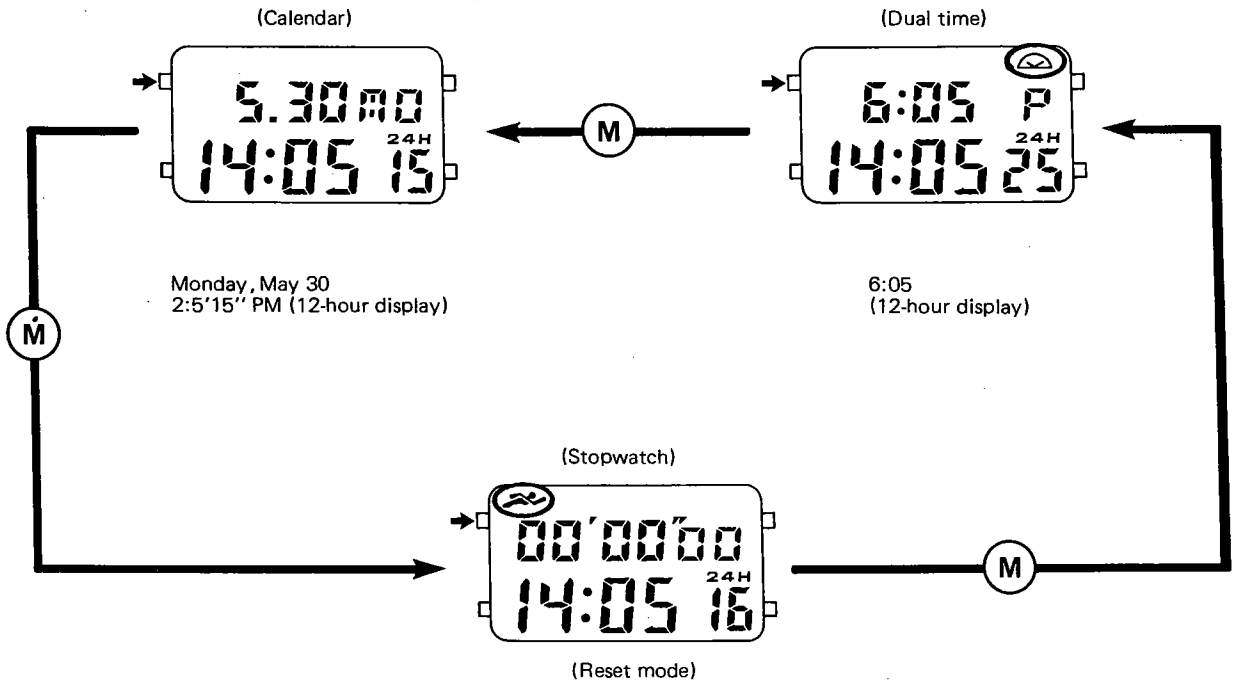
Example of display : 3 : 25 ' 36 " (12-hour display)  
Wednesday, July 2

● Stopwatch : Running (Lap running mode)



2) Switching of displays

The displays are switched in the following sequence with every push of M button.

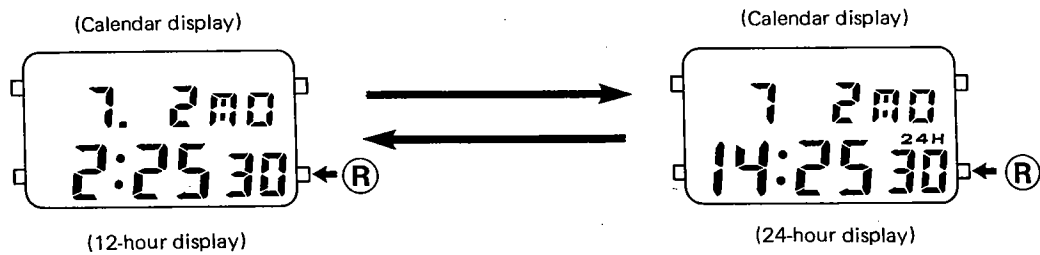


### 3) Switching between 12-/24-hour displays

The switching between the 12-hour and 24-hour displays is possible independently in the ordinary time mode and the dual time mode.

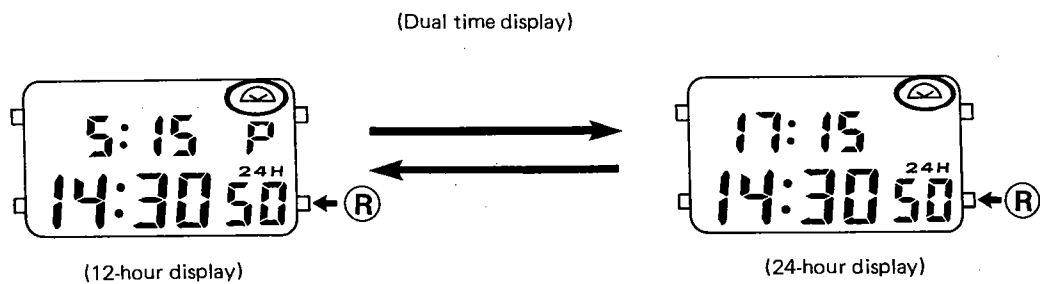
#### (1) Example of switching in ordinary time mode

\*The switching is carried out by consecutively pushing (R) button about 2 seconds.



\*The switching is carried out by consecutively pushing (R) button about 2 seconds.

#### (2) Example of switching in dual time mode

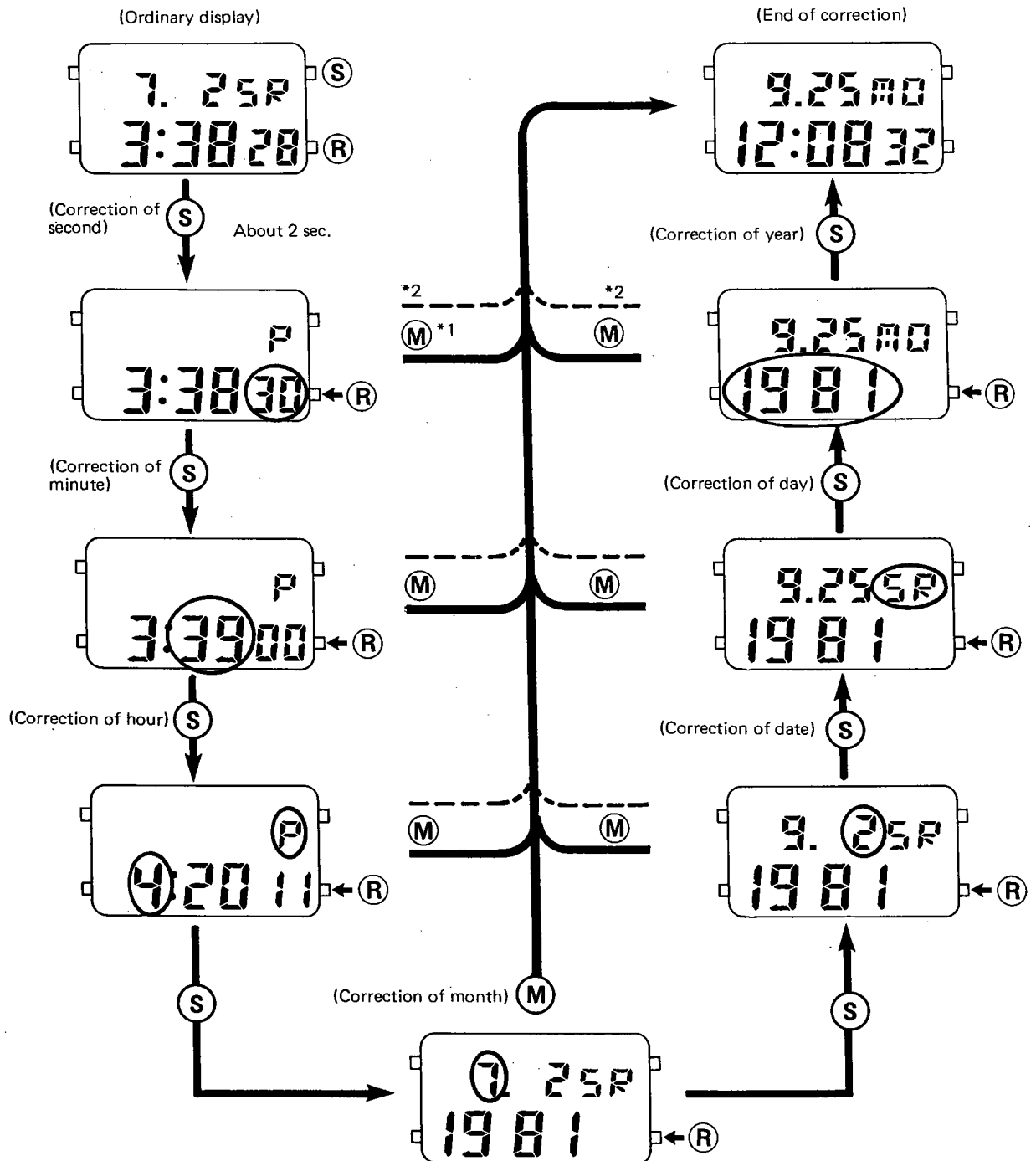


4) Operation in calendar display mode

(1) Correction of time

The digit to be corrected is called out by (S) button, and the time is corrected by (R) button. The (S) button is consecutively pushed about 2 seconds only when the second to be corrected is called out.

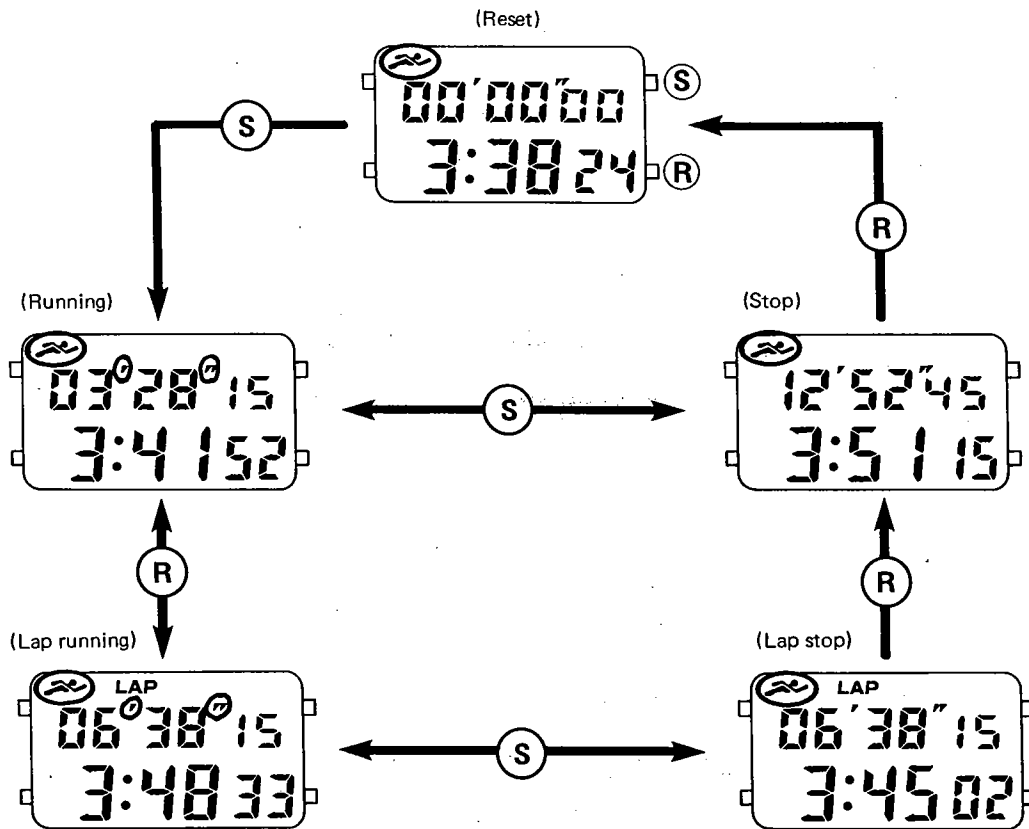
Example: "3:38 PM, Saturday, July 2, 1981" to be switched to "12:08 PM, Monday, September 25, 1981"



- \*1. Instant manual return ← (M)  
The ordinary display of time is reset in any mode of display by pushing (M) button.
- \*2. Auto-return ← ----  
The ordinary display of time is reset automatically in any mode of display if no push-button is operated for one to two minutes.
  - a) If the 0-second resetting is carried out with push of (R) button during the correction of second and while the second indicates 30 ~ 59, the minute is carried by a digit. However, no carrying of digit is performed in other corrections of time than the second since they are carried out independently.
  - b) The quick advance of time (8 Hz) is possible if (R) button is consecutively pushed for a second or longer in each mode of correction.
  - c) If a non-existing date is mistakenly set, reset the ordinary display of time from the mode of correction. Thus the first day of the following month is correctly set.

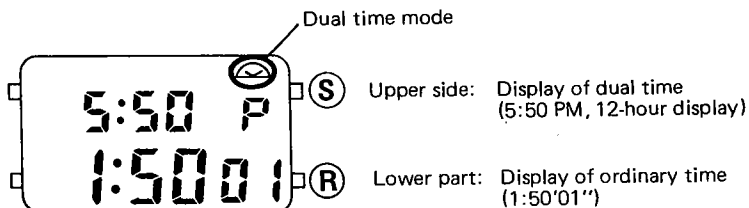
**5) Operation of stopwatch**

- Unit of measurement : 1/100 sec.
- Time of measurement : 59'59"99 (60-minute counting)



6) Operation in dual time mode

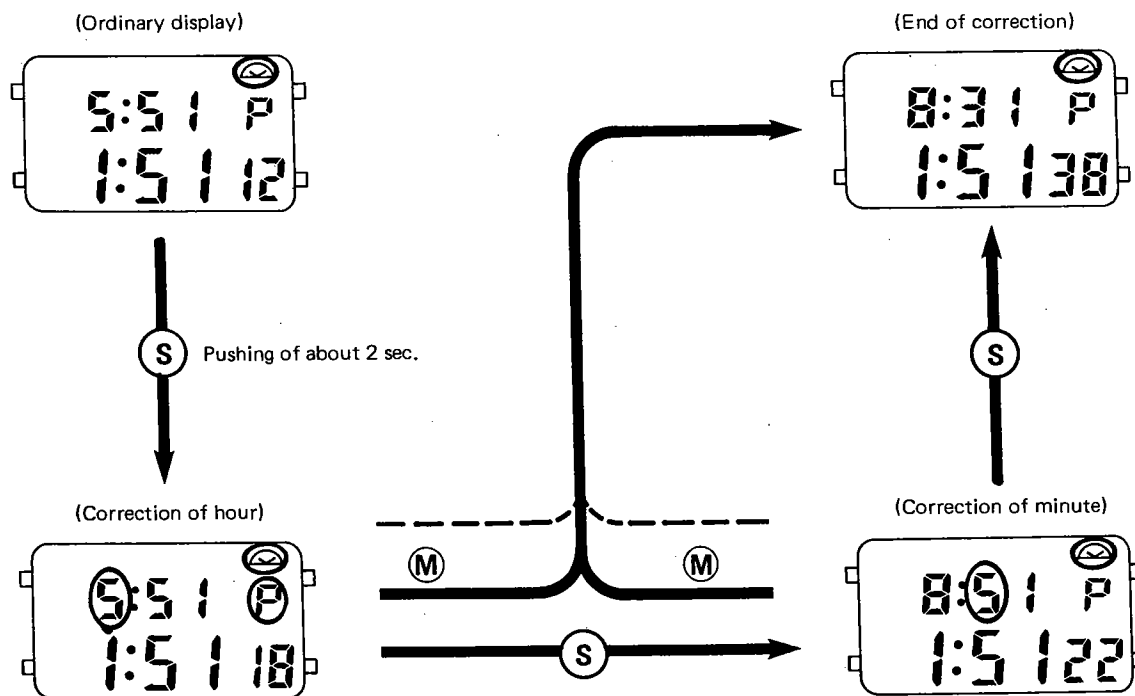
Example of display



• Method of correction

The digit to be corrected is called out by (S) button, and the time is corrected by (R) button.

Example: "5:50 PM" to be switched to "8:30 PM"



\*1. Instant manual return (← (M) )

\*2. Auto-return (←----)

\*3. The minute is corrected with every 10 minutes, and no correction is carried out with every minute.

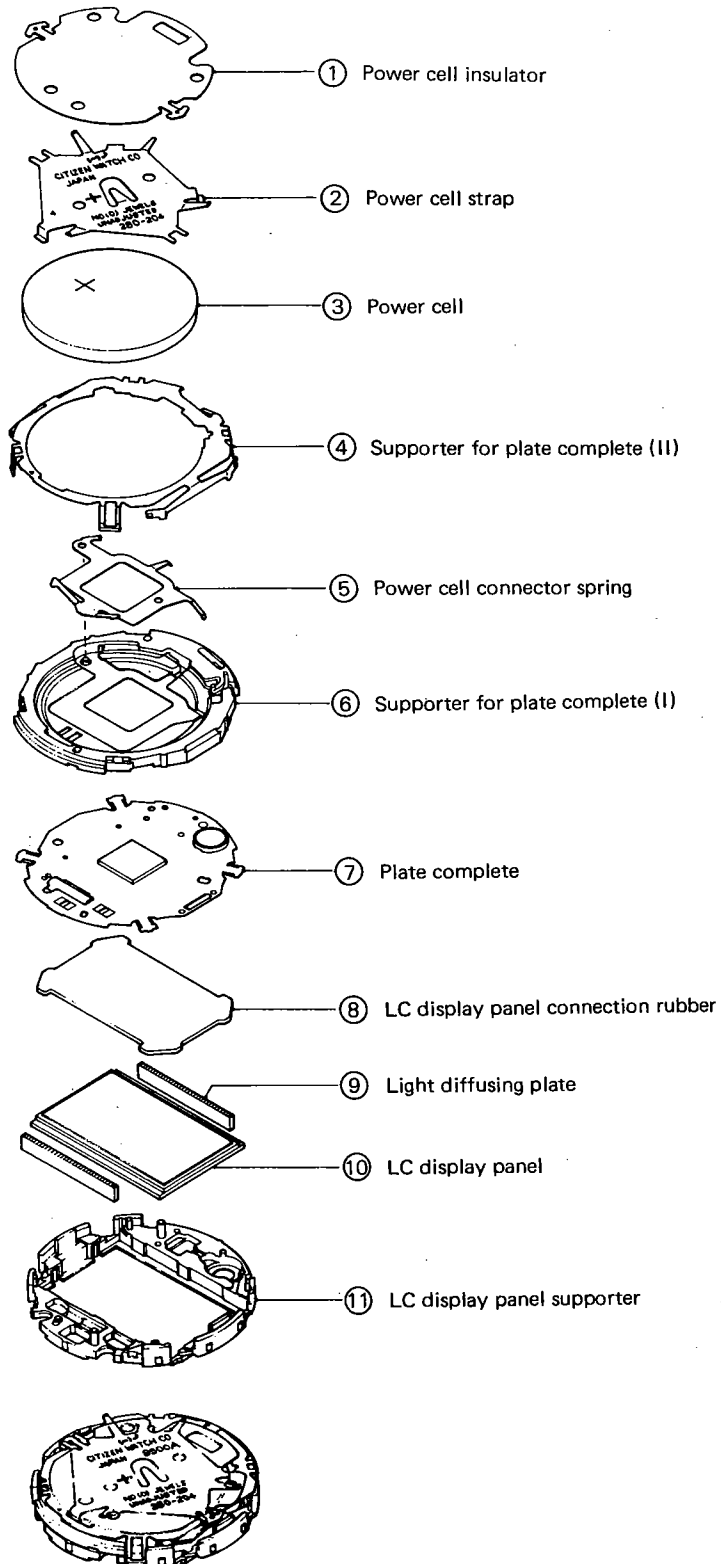
(Ex.) 5:44 P → 5:54 P → 5:04 P

• The quick advance of time (8Hz) is possible in each mode of correction by consecutively pushing (R) button for a second or longer.



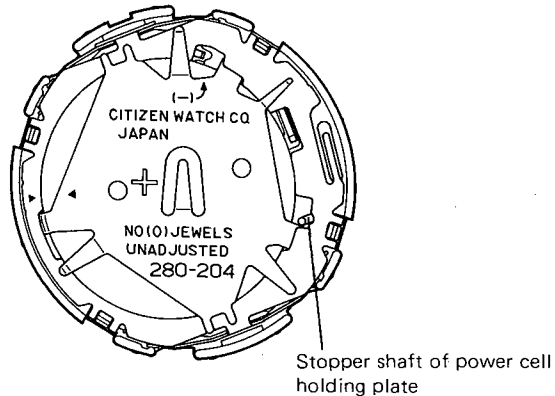
## ■5. DISASSEMBLY/ASSEMBLY OF MODULE

Disassembling procedure : ① → ⑪  
 Assembling procedure : ⑪ → ①



## 6. NOTES ON DISASSEMBLY/ASSEMBLY

- 1) Follow the procedure described below for an attachment and detachment of the power cell holding plate.

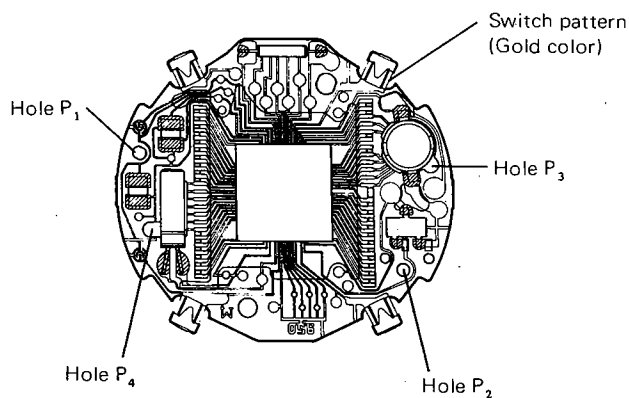


The power cell holding plate is slid left for detachment while the stopper shaft (shown by an arrow in the left diagram) is pushed up light with a tweezers or the like.

In this case, a good care must be given not to damage the stopper shaft.

When attaching the power cell holding plate, the holding plate is slid right while the tip of the holding plate is pressed down from above the stopper shaft.

- 2) Note the following points for an attachment and detachment of the plate complete.



- 1) The plate complete is positioned by holes  $P_1$  and  $P_2$ .

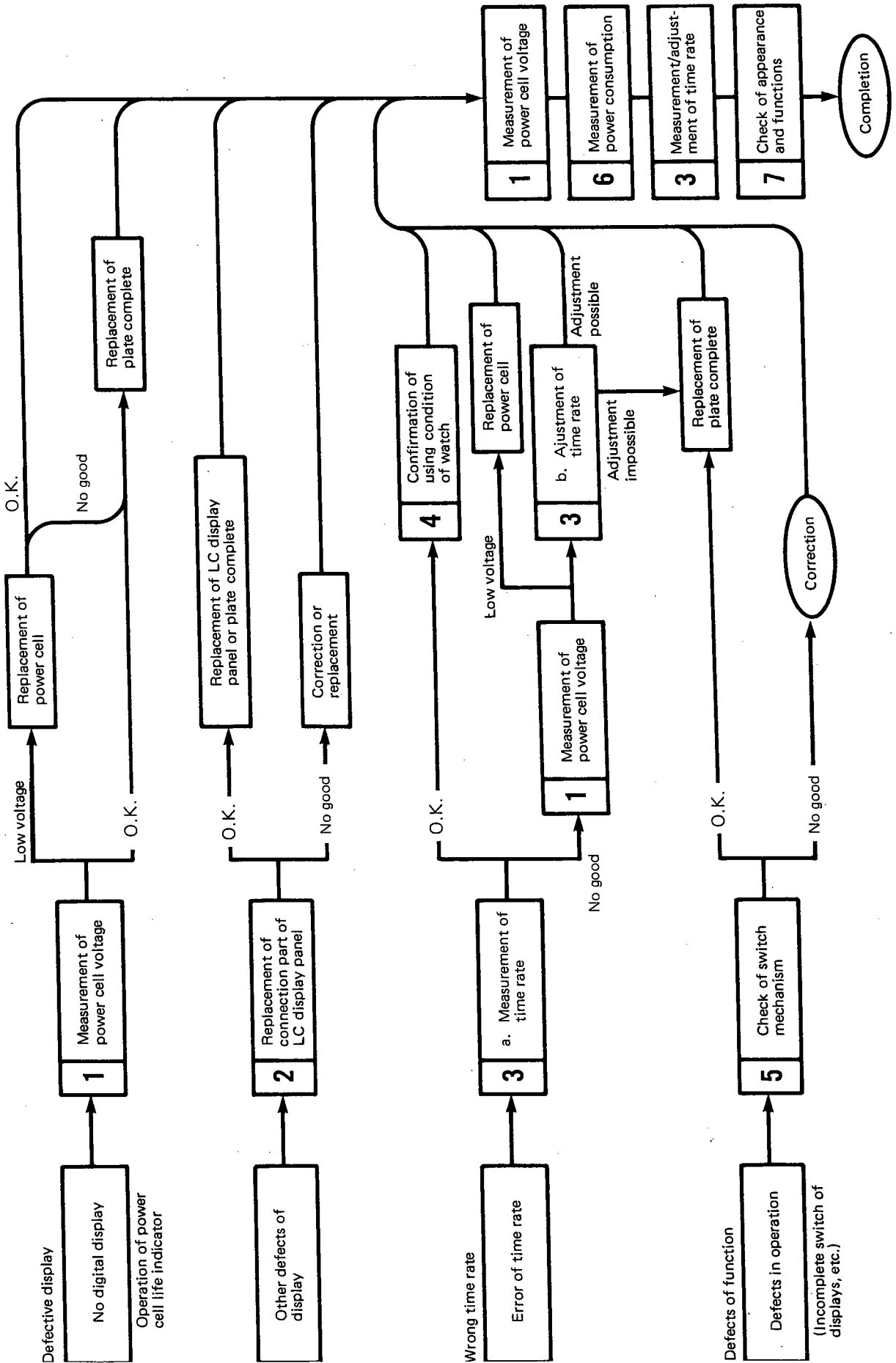
The holes  $P_3$  and  $P_4$  are provided to secure a correct fixing between the plate complete and the LC display panel supporter.

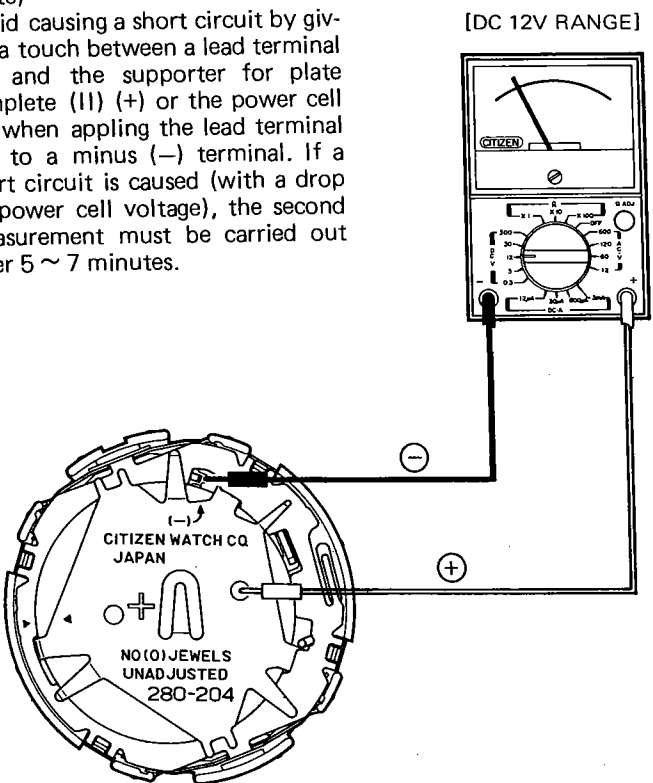
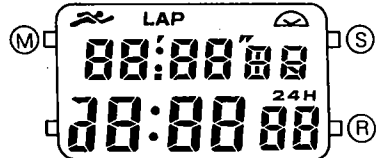
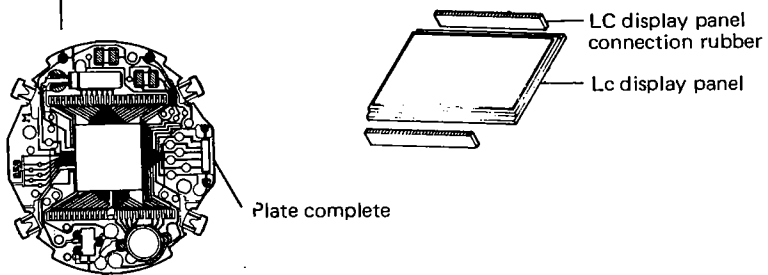
Avoid applying a large amount of force to the LC and other parts when setting these holes.

If a correct and complete fixing is not secured between the plate complete and the LC display panel supporter, the switch pattern may be broken when the supporter for plate complete (I) is attached.


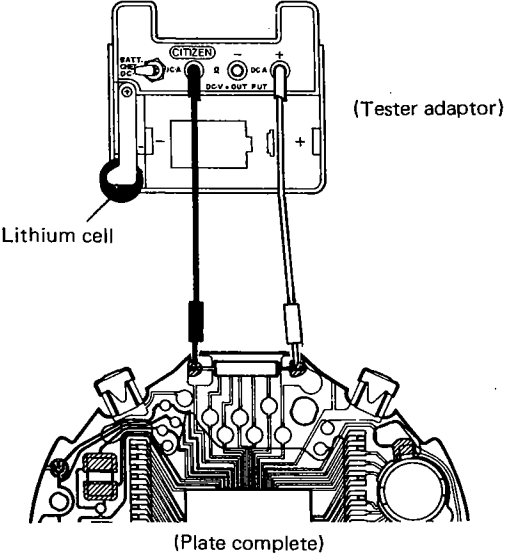
- 2) Avoid touching the switch pattern part with a tweezers or the like.

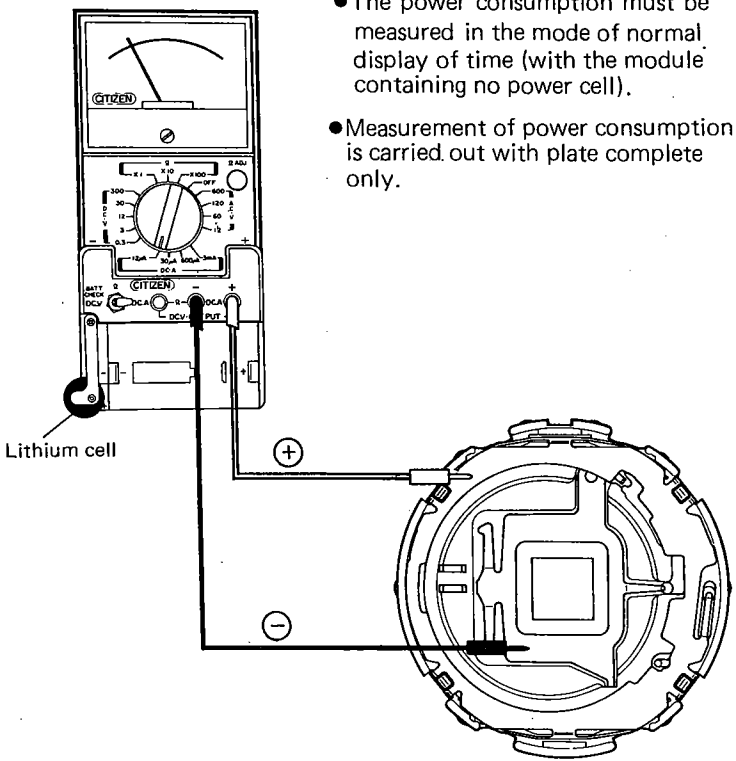
7. TROUBLESHOOTING AND ADJUSTMENT



Checking items	How to check	Results and treatment
<p><b>1</b> Measurement of power cell voltage</p>	<p>(Note) Avoid causing a short circuit by giving a touch between a lead terminal (-) and the supporter for plate complete (II) (+) or the power cell (+) when applying the lead terminal (-) to a minus (-) terminal. If a short circuit is caused (with a drop of power cell voltage), the second measurement must be carried out after 5 ~ 7 minutes.</p> 	<p><b>Over 2.8V</b> → Replacement of plate complete</p> <p><b>Under 2.8V</b> → Replacement of power cell</p>
<p><b>2</b> Check of connection part of LC display panel</p>	<p>1) Full-segment glow test With a simultaneous push of (M), (R) and (S) buttons each, all segments of display glow. Under such conditions, the defective segments can be detected conveniently.</p>  <p>2) Check of connection parts among LC display panel, connection rubber and plate complete</p> <ul style="list-style-type: none"> <li>● Make sure that each necessary component parts is set in a correct and complete way.</li> <li>● Make sure that each connection part is completely free from the dust, stains and crack or break, etc.</li> </ul> 	<p>Dust or stains → To be cleared away</p> <p>Crack, break or wear → Replacement with nondefective parts</p>

Checking items	How to check	Results and treatment
<b>3</b> Measurement of time rate	<p>Owing to the DFC method, this caliber has received a complete adjustment of time rate in terms of the circuit at the factory.</p> <p>If the time rate has a big error due to a severe shock or the like, the plate complete must be replaced with nondefective one.</p> <p>When measuring the time rate, set the "MEASURE TIME" at 10 sec. or its integer-fold value.</p>	
<b>4</b> Confirmation of using condition of watch	<p>When no defect is detected through a measurement of time rate (or no big error is detected in the time rate), the following points must be confirmed with the user of a watch.</p> <ol style="list-style-type: none"> <li>1) A wrong handling or mioperation of the watch.</li> <li>2) Use of the watch in an extreme change of temperatures.</li> <li>3) The time when an adjustment was given last to the time rate.</li> <li>4) And others.</li> </ol> <div style="text-align: center;"> </div>	
<b>5</b> Check of switch mechanism	<ol style="list-style-type: none"> <li>1) Check with complete module             <ul style="list-style-type: none"> <li>● Make sure that the supporter for plate complete (II) is set in a correct and complete way.</li> <li>● Make sure that a correct contact is secured between the switch part of the supporter for plate complete (II) and the connection part of the plate complete.</li> </ul> <p>Make sure that no dust, stains nor other foreign substances attach the contact part.</p> <div style="text-align: center;"> </div> </li> </ol>	<p>Malformation of switch part        → Repair of switch part</p> <p>Dust or stains        → To be cleared away</p>

Checking items	How to check	Results and treatment
	<p>2) Check of push-buttons</p> <ul style="list-style-type: none"> <li>● Make sure that both the case and the push-buttons are free from any malformation or stains.</li> </ul>  <p>(Note) Never fail to apply the silicone oil to the push-buttons to maintain a water resistance as well as a smooth operation of buttons.</p>	<p>Malformation of push-button          → Replacement with nondefective one</p> <p>Dust or stains          → To be cleared away</p>
<p>6 Check of lamp</p>	<p>As illustrated below, the lead led from the OUTPUT terminal of the adaptor is applied across a lamp. (No definition is required for the polarity.)</p>  <p>(Tester adaptor)</p> <p>Lithium cell</p> <p>(Plate complete)</p>	<p>No lighting of lamp          → Replacement of plate complete</p>

Checking items	How to check	Results and treatment
<p>7 Measurement of power consumption</p>	<p>[DC 12<math>\mu</math>A RANGE]</p>  <ul style="list-style-type: none"> <li>• The power consumption must be measured in the mode of normal display of time (with the module containing no power cell).</li> <li>• Measurement of power consumption is carried out with plate complete only.</li> </ul>	<p><b>Under 1.6<math>\mu</math>A</b> → Nondefective</p> <p><b>Over 1.6<math>\mu</math>A</b> → Measurement of power consumption with plate complete only</p> <p><b>Over 1.1<math>\mu</math>A</b> → Replacement of plate complete</p> <p><b>Under 1.1<math>\mu</math>A</b> → Replacement of LC display panel</p>
<p>8 Check of appearance and functions</p>	<p>The following points are checked with a complete watch.</p> <ol style="list-style-type: none"> <li>1) Make sure that no defect is detected in the display.</li> <li>2) Make sure that the operation is correct and smooth for each push-button.</li> <li>3) Make sure that the display screen of the LC display panel is free from the dust or stains.</li> </ol>	

## ■8. MISCELLANEOUS INFORMATION

As mentioned before, this caliber adapts the DFC method.  
And a reproduction of plate complete is not carried out due to the following factors.

Each of the quartz crystal oscillators used in the quartz watches has its own accuracy of production (variance) in terms of frequency.

According to this variance of frequency, a disconnection is given to the pattern for control to vary the frequency and then adjust the time rate (DFC method).

Here if a quartz crystal oscillator having a different frequency is used in replacement with a defective oscillator, some error is naturally caused for the time rate.

In this connection, a replacement must be carried out for the plate complete in case no terminal for adjustment is used owing the DFC method.

In addition, a consideration must be given also to the illumination lamp and the condenser in terms of an application of the spot welding, the material of the plate (polyimide film) and other factors.

Under such circumstances, the repair of the plate complete is very difficult on the market.  
Thus the plate complete must be replaced with a nondefective one if the lamp or condenser is defective

**CITIZEN WATCH CO., LTD.**

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