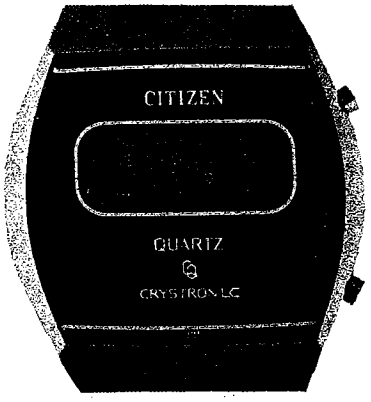
TECHNICAL INFORMATION

CITIZEN QUARTZ

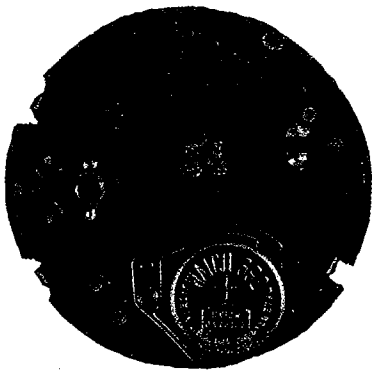
Cal.No.917※※

CITIZEN

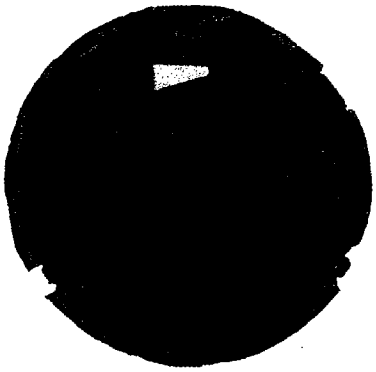
1. OUTLINE



This is an ultra-thin type digital quartz crystal watch, with constant display of "hour", "minute", "second" and "AM/PM" plus the calendar display of "month", "date" and "day".
It features a very compact movement as well as a push-button type mechanism which excels in smooth manipulation.



Movement (Power cell side)



Movement (LC display panel side)

2. FEATURES

1) Ultra-thin and compact movement
Thanks to the small-size and thin quartz crystal oscillator, IC and other component parts, the watch as a hole is completed into an ultra-thin and compact size with an attractive design.

2) Power cell life indicating device
When the power cell capacity becomes very small, the whole mark of the colons will begin flashing to indicate replacement of the power cell.

3) Automatic calendar correction system
The calendar correction is performed automatically at the end of each month, even for a leap year, by setting the year at a correction mode.
(The year correction setting can be carried out in the cycle of 70, 70∿99, 00∿09, 70.)

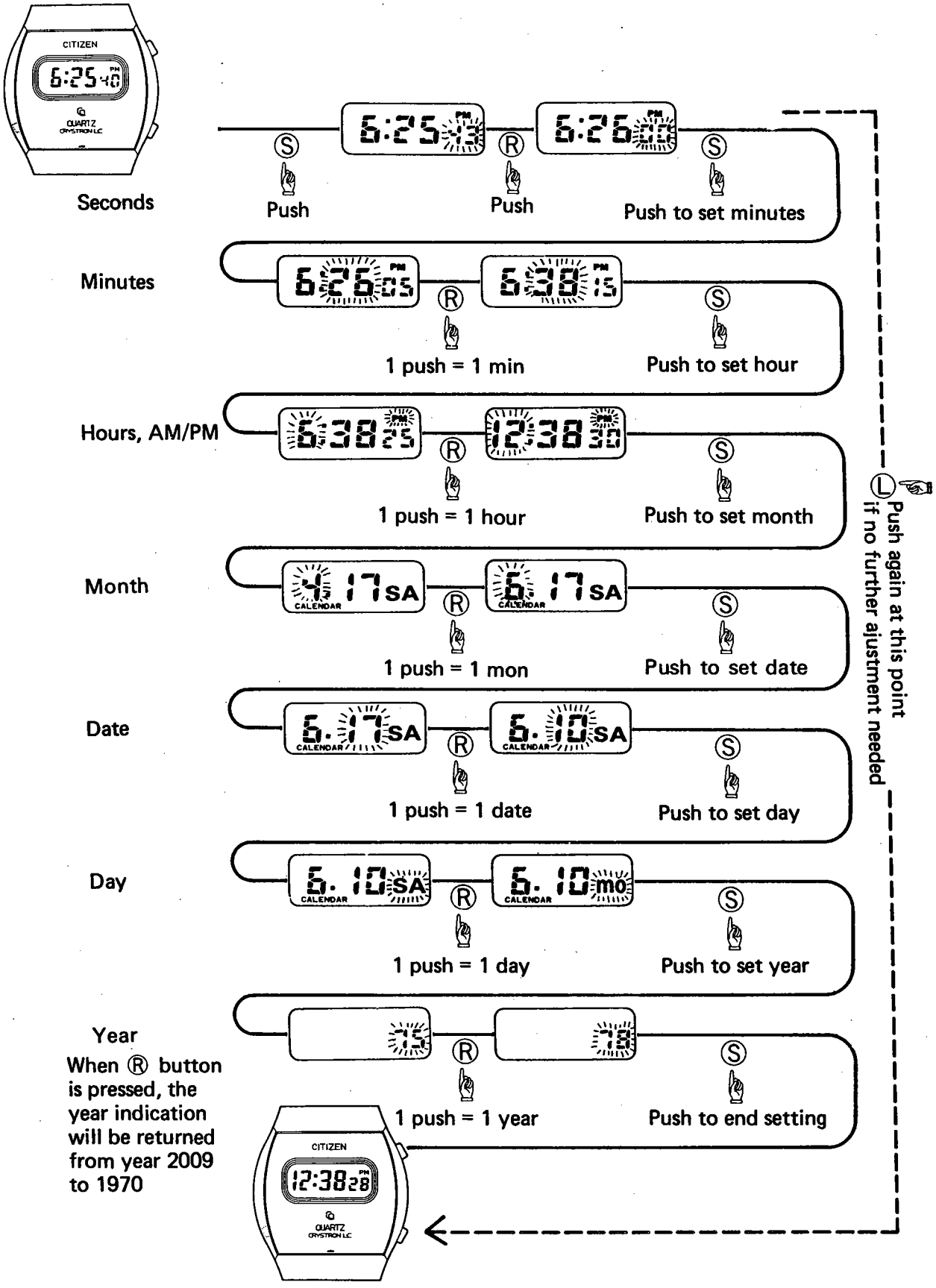
4) Forced manual return system
An easy return to the normal display is possible from a correction mode through operation of Ⓛ button.

5) Built-in illumination lamp
An illumination lamp is incorporated to facilitate an easy readout of the time even in a dark place.

6) One-year continuous operation with one small-size silver oxide power cell
The watch can operate accurately for continuous one year on only one small-size silver oxide power cell with 5-sec. lamp lighting per day.

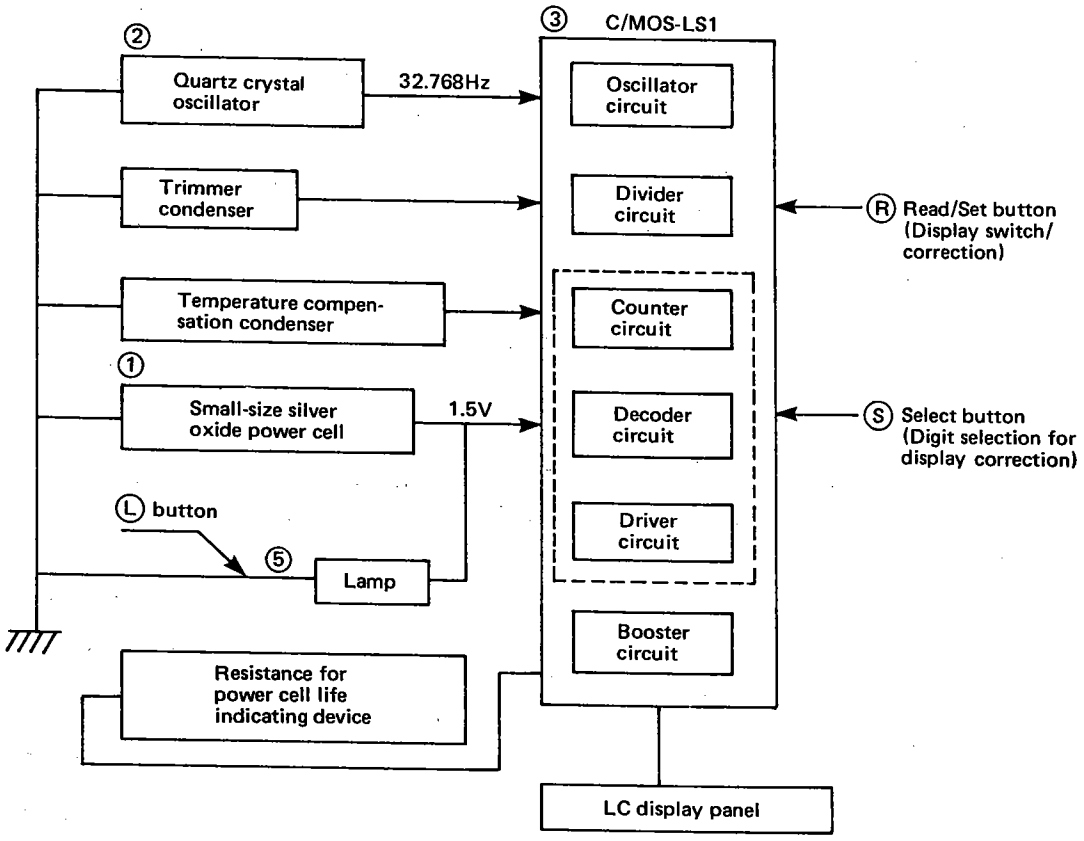
3. HANDLING INSTRUCTIONS

1) How to read time and calendar



4. STRUCTURE AND FUNCTION

1) Structure



2) Function

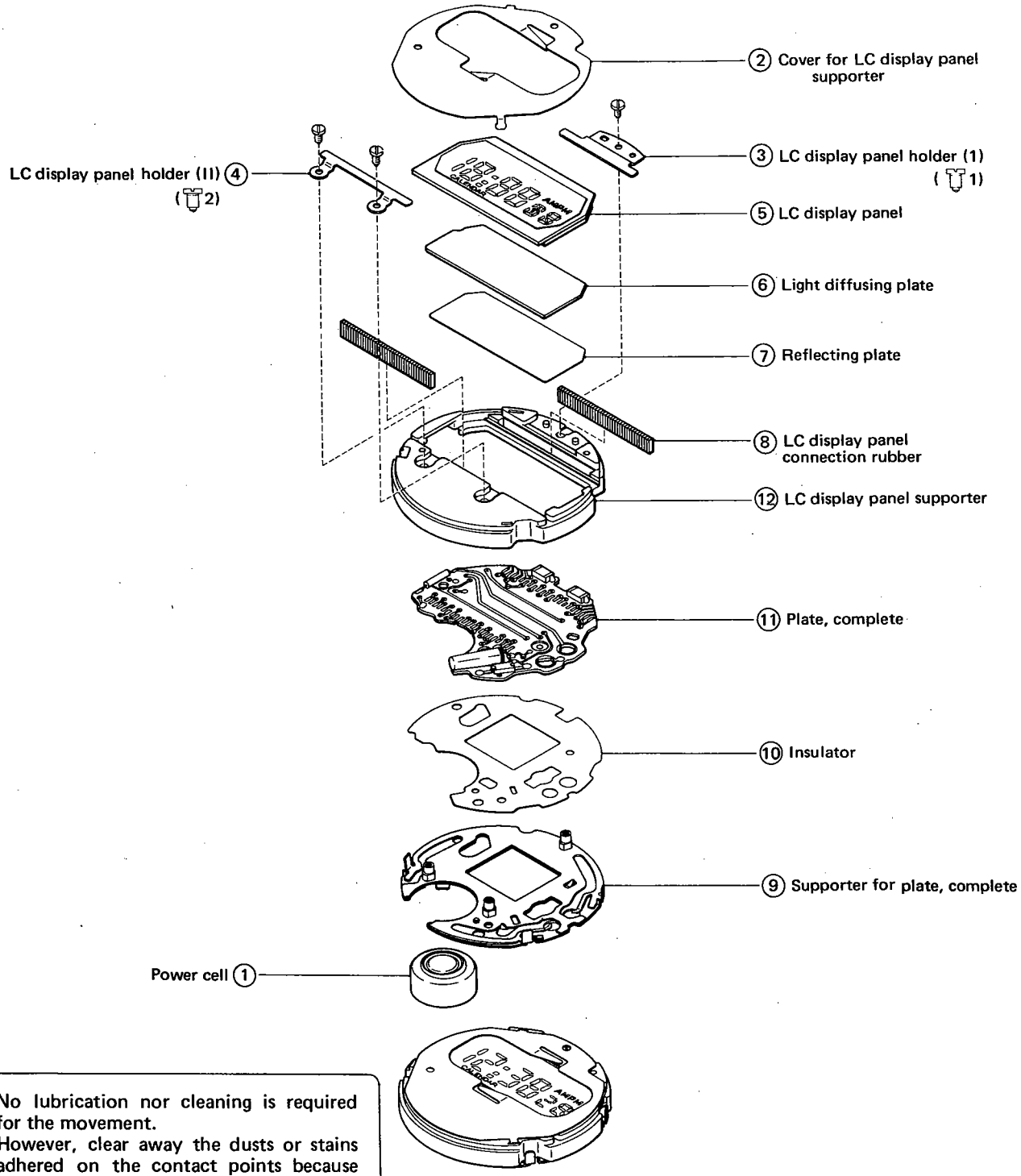
The watch of Cal. No. 9170A consists of ① a small-size silver oxide power cell, ② a quarts crystal oscillator and oscillator circuit, ③ booster/counter/driver circuit, and ④ an LC display panel, plus some additional mechanisms such as ⑤ illumination lamp, etc. The quartz crystal oscillator performs an extremely high oscillation of 32,768Hz. This high oscillation is then converted directly into an electrical signal of 32,768Hz. And this electrical signal is divided at a divider circuit down to a necessary frequency, which is then given a level-up through the booster circuit. Then, this divided signal is counted at a counter circuit in the form of "second", "minute", "hour", "AM/PM", "date", "day" and "month". The counted signal decides through a decoder circuit to which segment of the figure display a voltage should be applied. The decided signal actuates a driver circuit, and the signal sent from the driver circuit is supplied to the LC display panel.

5. SPECIFICATIONS

Caliber No.	9170A
Movement	Diameter : 23.7 mmϕ Thickness : 3.765 mm
Oscillation	32.768Hz
Accuracy	±10 sec./month (under normal temperature & with temperature compensation condenser)
Display system	FE twist-type nematic liquid crystal display
Display information	Constant digital display of "hour", "minute" and "second", "day", "date" and "month", which are switched through operation of push-buttons
Display correction	Independent correction/setting system by operation of push-button
Effective temperature range	0°C (32°F) to +60°C (140°F)
Semiconductor	C/MOS–LSI
Additional mechanisms	○ Power cell life indicating device ○ Automatic calendar correction system at the end of each month. ○ Built-in illumination lamp ○ Forced manual return system
Power cell	Small-size silver oxide power cell Parts No. : 280-13 Voltage : 1.5V Capacity : 38 mAH Size : 7.9ϕ x 3.6 mm Life : 1 year

6. DISASSEMBLY AND ASSEMBLY OF MOVEMENT

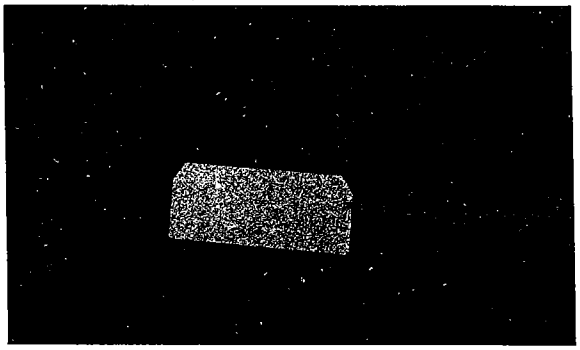
- Disassembling procedure ① → ⑫
- Assembling procedure ⑫ → ①
- The number of screws necessary for parts is shown like (1)



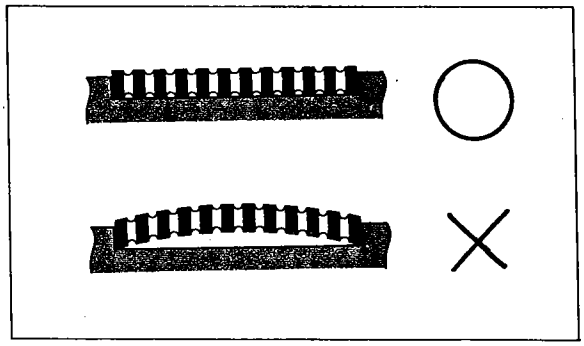
No lubrication nor cleaning is required for the movement.
However, clear away the dusts or stains adhered on the contact points because they may impair good conductivity.

NOTES

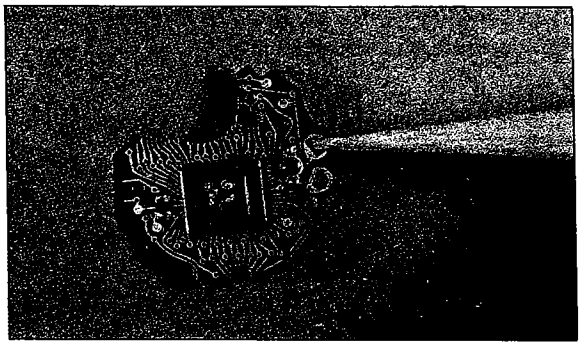
1) **Handling of light diffusing plate and reflecting plate**
In order to avoid damage or stains, use fingerstalls or bamboo tweezers and hole the extreme edge of the plate when handling the light diffusing plate and reflecting plate.



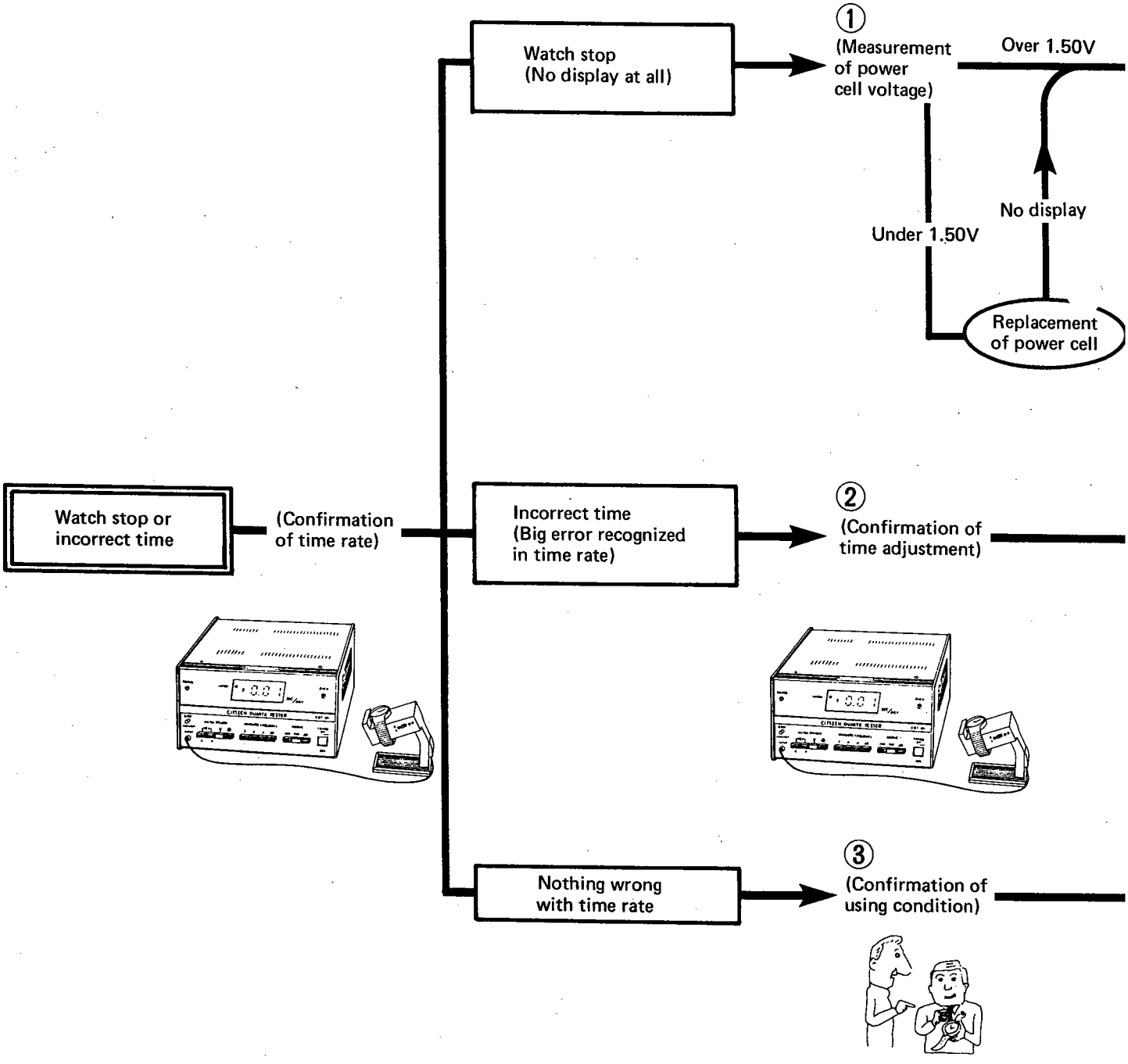
2) **Handling of LC display panel connection rubber**
The LC display panel connection rubber functions to perform an electrical conduction between the plate and LC display panel. In this respect, conduct an immediate replacement of the rubber if it loses elasticity or is extremely stretched out to ensure a sufficient contact with the LC display panel supporter.



3) **Handling of plate, complete**
The plate of this watch is made of ceramics so that take good care not to cause cracks or flaws on it. Although a special protective treatment is applied on the plate, finger prints or flaws caused by the use of a metal tweezers may deteriorate the plate function. Therefore, use fingerstalls or bamboo tweezers when handling the plate.



7. TROUBLESHOOTING



Replacement of plate, complete

Display

Time adjustment possible

Time adjustment impossible

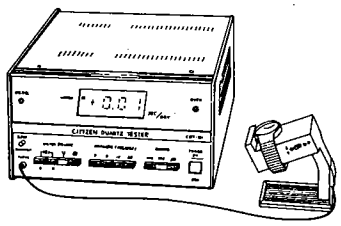
Replacement of plate, complete

Common Checking Items

⑨ (Measurement of power cell voltage)

⑩ (Measurement of power consumption)

⑪ (Time adjustment)



⑫ (Check of appearance functions)

Completion

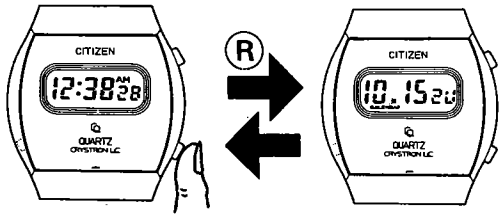
Incomplete functioning of display and related mechanisms

Segment invisible partially

④ (Check of LC display panel connection section)

Display switching impossible

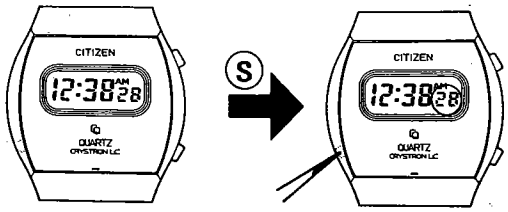
⑤ (Check of display switching mechanism)



Digit selection impossible for "hour", "minute", "second", "date" and "month"

⑥ (Check of digit selection mechanism)

Incomplete functioning of additional mechanisms



No lamp lighting

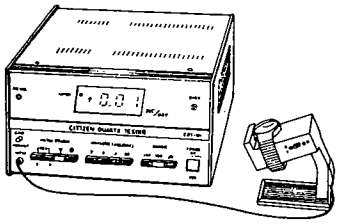
⑦ (Check of lamp lighting mechanism)

Common Checking Itms

⑨ (Measurement of power cell voltage)

⑩ (Measurement of power consumption)

⑪ (Time adjustment)



⑧
(Check of push-buttons
& switch spring)

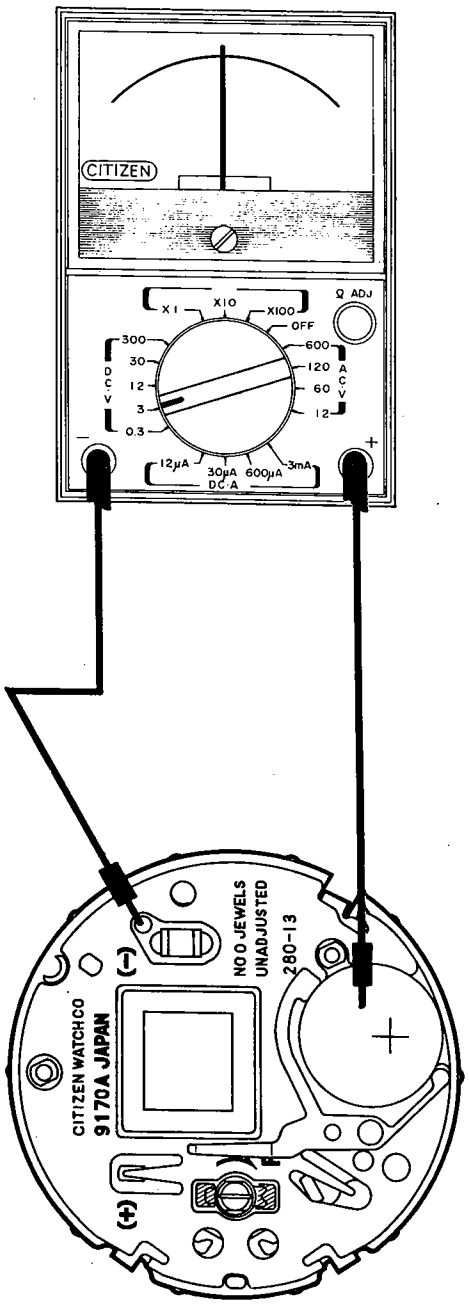
⑫ (Check of appearance functions)

Completion

Watch stop—No display at all

1 Measurement of power cell voltage

Power cell voltage: Over 1.5V



Result and Treatment

Over 1.5V

- Correct display of LC display panel
  → ⑩ Measurement of power consumption
- No display of LC display panel
  → Replacement of plate.

Under 1.5V

Replace power cell:

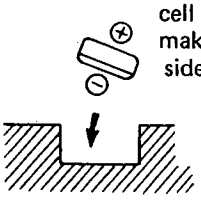
- Correct display of LC display panel
  → ⑩ Measurement of power consumption
- No display of LC display panel
  → Replacement of plate.

Note

If the watch has been used more than two years, replace the power cell with the new one even if it shows more than 1.5V output power.

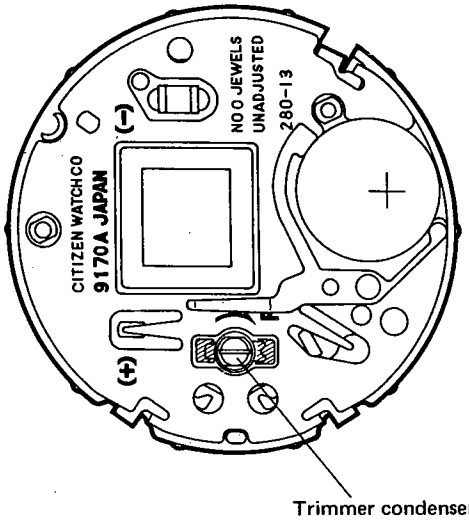
How to Install Power Cell

When installing power cell into the watch, make the minus (—) side face down.

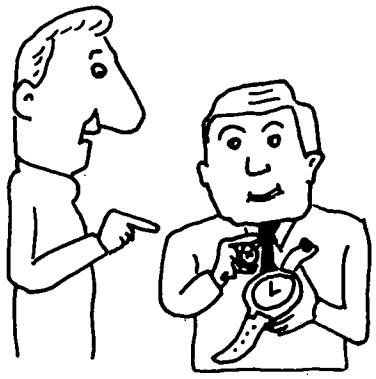


Big error recognized in time rate

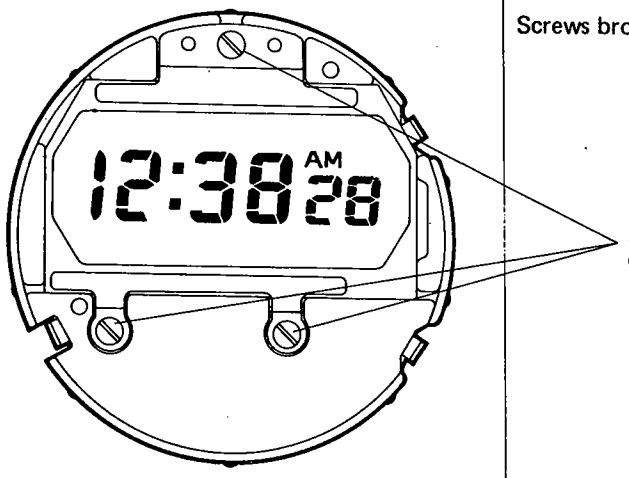
Check item	How to check	Results	Treatment
2 Confirmation of time rate adjustment	As for the cause of the incorrect time (big error), it is considered that the quartz crystal oscillator attached to the plate has a big error in its frequency. Conduct check in the following procedure. 1. Check whether time adjustment is possible by the trimmer condenser.		
	2. The time adjustment is well possible by the trimmer condenser.	→	Common checking items
	3. In case the time adjustment is impossible by the trimmer condenser, the quartz crystal oscillator has some defects.	→	Replacement of plate, complete

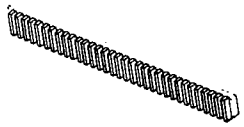
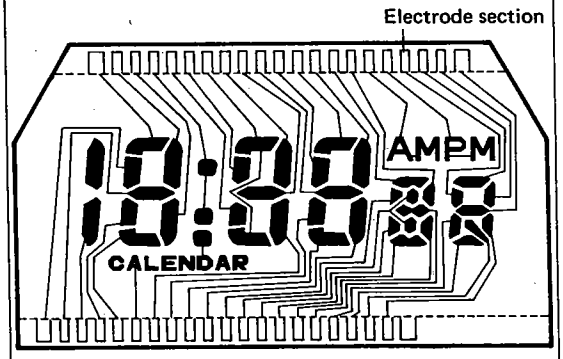
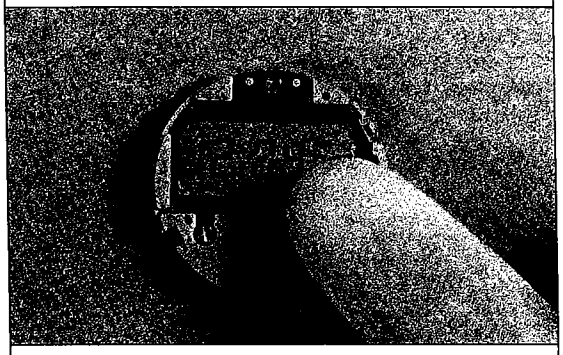


Watch stop or incorrect time – Nothing wrong with time rate

Check item	How to check	Results	Treatment
3 Confirmation of using condition	Confirm how the customer has used the watch. Ex. Weren't there any mistakes in handling the watch? And others. 		

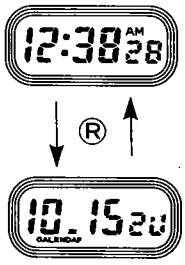
Incomplete display – Segment invisible partially

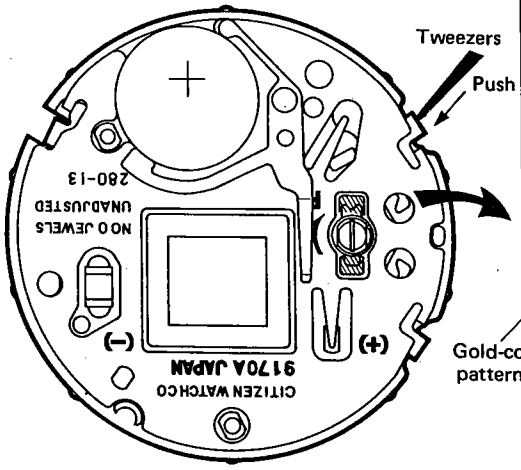
Check item	How to check	Results	Treatment
4 Check of LC display panel connection section	For the inconvenience of segment invisible partially, the following reasons may be considered. 1. Poor contact between LC display panel and electronic circuit 2. Some defects in LC display panel itself 3. Some troubles with electronic circuit Among the above three reasons, 1. is considered as the main reason in most cases. So that carry out check for the contact areas of the electronic circuit as follows. (1) Aren't the screws for LC display panel holder broken or loosened? 	Screws loosened → Retightening Screws broken → Replacement of screws	

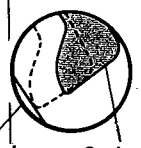
Check item	How to check	Results	Treatment
	(2) Conduct check for the LC display panel connection rubber as follows. a. Isn't the rubber twiested? b. Isn't the rubber worn out or extremely stretched? c. Isn't there any dusts or stains adhered on the rubber?	Rubber twisted →	Replacement of rubber
		Rubber worn out →	Replacement of rubber
	 LC display panel connection rubber		
	(3) Referring to the drawing below, conduct check for the electrodes of the segment-broken parts. 		
	▪ Check points The quickest way of checking the segment breakage is to softly press the place around the segment-broken area as illustrated below. At this moment, if the broken segment is displayed again it is manifest that the contact is incomplete between the LC display panel and electronic circuit. 		
	Note: Well mind not to use a strong force when pressing the LC display panel in order to avoid the glass breakage.		

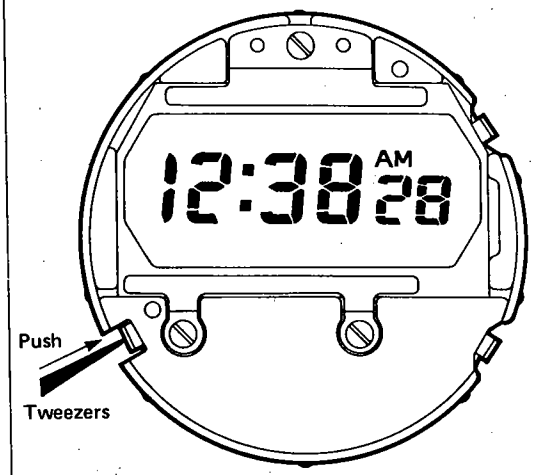
Display switching impossible

Check item	How to check	Results	Treatment
5 Check of display switching mechanism	In case the display switching is impossible between "hour", "minute" and "second" plus "month", "date" and "day", the following causes are conceivable. 1. Fault in the electrical system including a trouble within the electronic circuit. 2. Fault in the mechanical system such as the unstable contact, deformation of the parts, etc. Have a check for the above points in the following procedures. First, take the movement out of the case. 1. Check for the electrical system Push the switch part equivalent to Ⓡ button with a tweezers, and confirm whether the spring attached to the supporter for plate complete touch the gold-color pattern. At the same time, confirm that the display switches correctly from "hour", "minute" and "second" to "month", "date" and "day" at the display part.	Correct display switching →	→ No fault within electronic circuit, so proceed to Ⓢ (Check of push-buttons and switch spring)
		No display switching →	→ Fault conceivable in electronic circuit, so replace the plate complete.
	2. Check for the mechanical system Check whether the switch spring attached to supporter for plate complete has some deformation.		

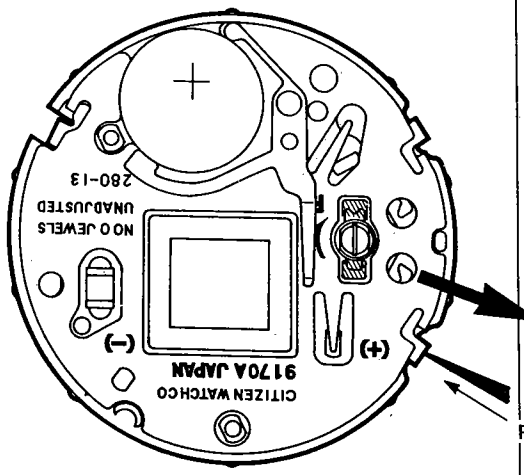


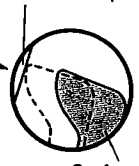


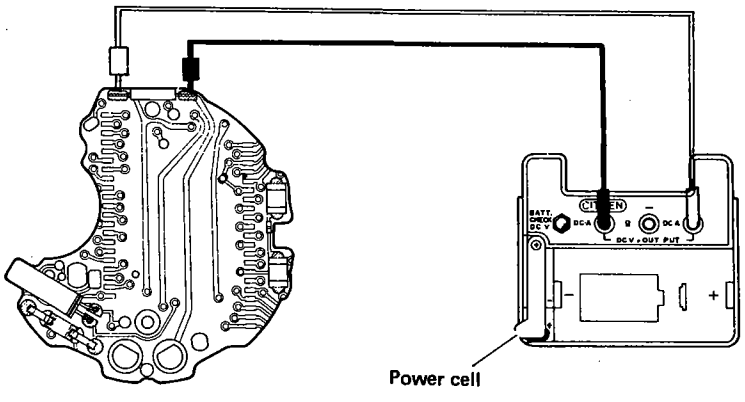


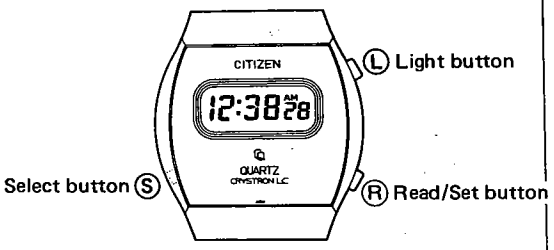
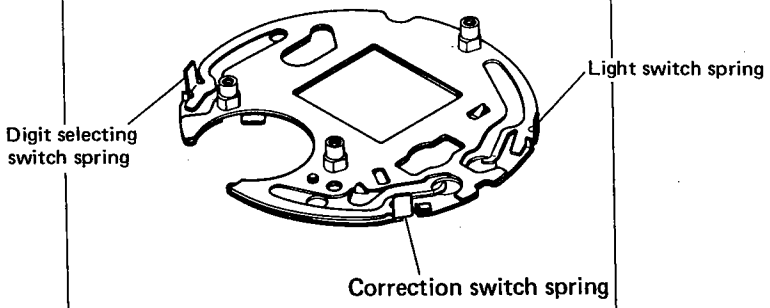
Check item	How to check	Results	Treatment
6 Check of digit selection mechanism	The following causes are conceivable in case the digit selection is impossible through flashing for "second", "minute", "hour", "month", "date", "day" and "year" in that order from the normal time display. 1. Fault in the electrical system including a trouble of the electronic parts. 2. Fault in the mechanical system such as the unstable contact, breakage of the parts, etc. Have a check for the above points in the following procedure First take the movement out of the case. 1. Check for the electrical system Push the switch part equivalent to Ⓢ button with a tweezers, and confirm that the digit selection is possible for "second", "minute", "hour", "month", "date", "day" and "year" respectively.  Note: The digit selection is impossible under the state of the calendar display of "month", "date" and "day". So return the display to the normal time display state to carry out the above check.	Digit selection impossible →	No trouble in the electrical system, so proceed to Ⓗ (Check of push-buttons)
		Digit selection possible →	Trouble conceivable in electronic circuit, so replace the plate complete.

Check items	How to check	Results	Treatment
7 Check of lamp lighting mechanism	The following causes are conceivable for the fault in that the lamp does not light up with push of Ⓛ button. 1. Fault in the electrical system including a faulty lamp. 2. Fault in the mechanical system such as the deformation of parts, unstable contact, etc. Have a check for the above points in the following procedure First, take the movement out of the case. 1. Check for the electrical system Push the switch part equivalent to Ⓛ button with a tweezers, and check whether the spring attached to supporter of plate complete touch the gold-color pattern. At the same time, confirm that the lamp lights up.	Lamp lighting →	No fault in electronic circuit, so proceed to ⑧ (Check of push-buttons and switch spring)
		No lamp lighting →	Check for lamp itself
	2. Check for lamp As shown in the diagram below, apply the adaptors of Citizen Multi-Tester to the both terminals of the plate complete. And check whether the lamp lights up or not.	Lamp lighting →	Check for spring of the supporter of plate completer
		No lamp lighting →	Replacement of plate, complete





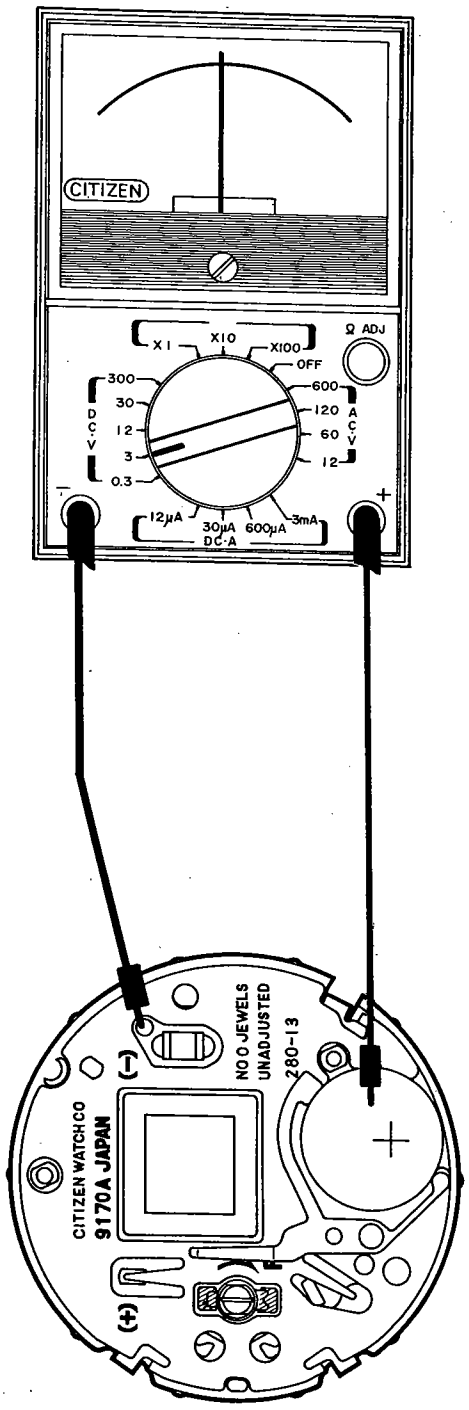


Check items	How to check	Results	Treatment
8 Check of push-buttons and switch spring	In case no fault exists in the electronic circuit, the conceivable causes are the deformation or breakage of the push-buttons or switch spring. 1. Check for push-buttons 1) Check the push-buttons themselves as well as whether some dust or iron filings stick to the contact surface between the push-buttons and the case. 2) Check whether the push-buttons have some bend or breakage.  2. Check for the switch spring which is attached to the plate supporter panel.  		

Common checking items

9 Measurement of power cell voltage

Power cell voltage: Over 1.5V



Result and Treatment

Over 1.5V

- Correct display of LC display panel
  → ⑩ Measurement of power consumption
- No display of LC display panel
  → Replacement of plate.

Under 1.5V

Replace power cell:

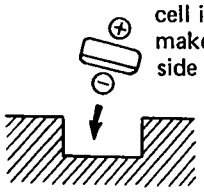
- Correct display of LC display panel
  → ⑫ Measurement of power consumption
- No display of LC display panel
  → Replacement of plate

Note

If the watch has been used more than two years, replace the power cell with the new one even if it shows more than 1.5V output power.

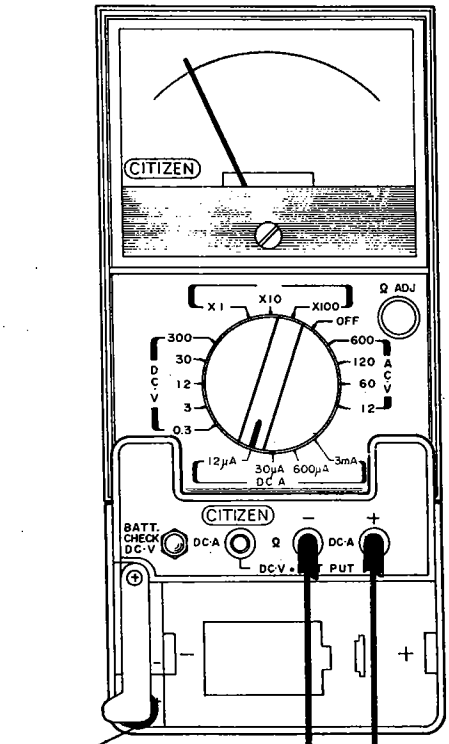
How to Install Power Cell

When installing power cell into the watch, make the minus (−) side face down.

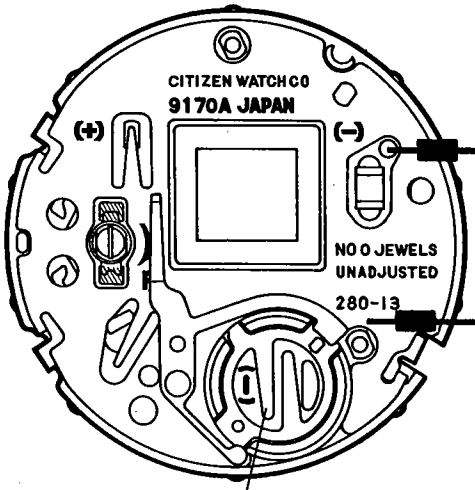


10 Measurement of power consumption

Power consumption=Under 4μA



Power cell



Without power cell

Result and Treatment

1) Measurement under the normal condition:

Under 4μA
→ (11) Time adjustment

Over 4μA
→ 2) Measurement of power consumption of electronic circuit

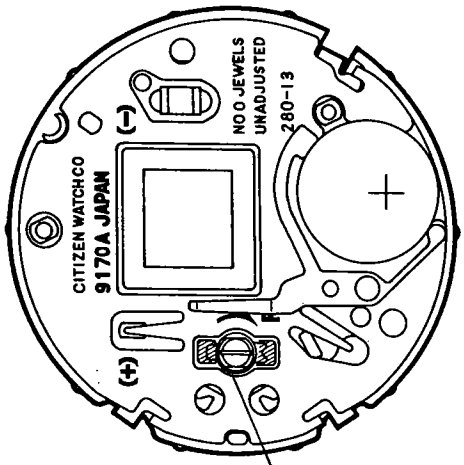
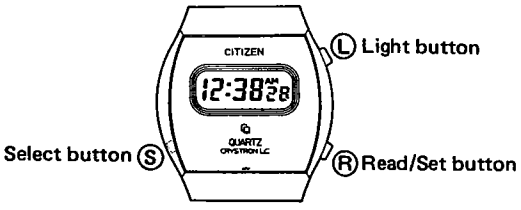
2) Measurement of power consumption at electronic circuit with LC display panel removed

Under 2μA
→ Replacement LC display panel connector, or LC display panel

Over 2μA
→ Replacement of plate, complete

Note

Install a power cell of more than 1.5V into the power cell holder of the adaptor.

Check items	How to check	Results	Treatment
11 Time adjustment	Conduct measurement of time reat using a timing machine and confirm time adjustment. The time adjustment can be performed by turning right and left the operation plate of the trimmer condenser.  Trimmer condenser		
12 Check of appearance functions	Finally, conduct check and adjustment for the appearance functions as follows. 1) Make sure the displayed figures have no trouble at all. 2) Make sure each of the push-buttons is correctly functioning for the display switching/correction, lamp lighting and others.  		

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