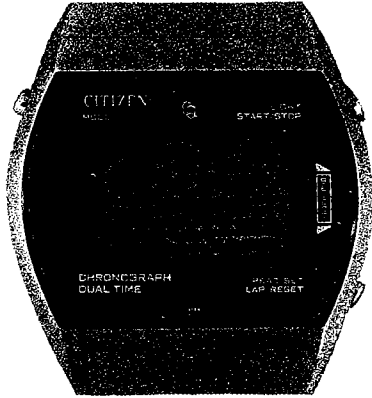


***TECHNICAL
INFORMATION***

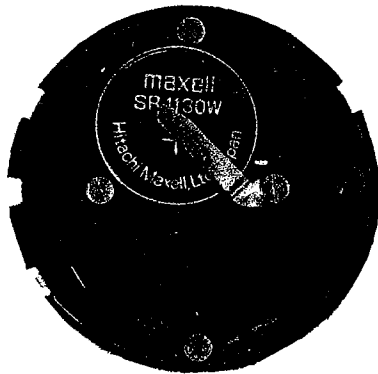
**CITIZEN QUARTZ
Cal.No.918※※**

 **CITIZEN**

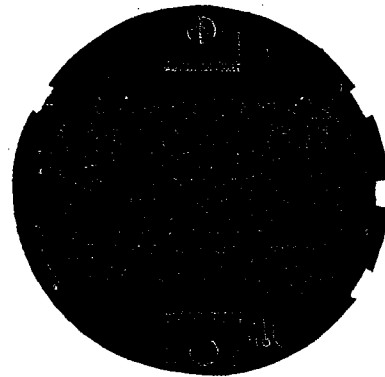
1. OUTLINE



This is a digital quartz crystal watch with liquid crystal display, featuring a compact and thin movement plus an excellent design and smooth manipulation. It contains the chronograph mechanism, dual time mechanism, service-mark display, and others in addition to the normal time display and calendar display.



**Movement
(Power cell side)**



**Movement
(LC display panel side)**

FEATURES

1) Multi-function quartz crystal watch:

In addition to the normal time display of "hour", "minute", "second", "AM/PM" and "day", the watch contains multiple functions including the chronograph mechanism, dual time mechanism as well as the calendar display of "month", "day", "date" and "year" respectively.

2) Service-mark display:

With addition of a service-mark, the contents of the display can be known at a glance.

3) High accuracy produced by quartz crystal oscillator:

Such a high accuracy as ± 10 sec./month under normal temperature can be maintained thanks to highly stabilized frequency of 32,768Hz as well as a temperature compensation circuit.

4) Automatic calendar correction:

The "month", "date" and "leap year" are all memorized in a C/MOS-LSI, so the calendar is corrected and set automatically at the end of each month as far as the "year" is once set.

5) Built-in internal illumination lamp:

An internal illumination lamp is built into the watch to facilitate an easy readout of the time even in a dark place.

6) Push-button type switch mechanism excelling in smooth manipulation:

A smooth and easy manipulation is ensured with four push-buttons for the display switching, display correction, function selection and for the internal illumination.

7) Easy-to-assemble/disassemble movement:

The number of the component parts has been reduced extremely, which contributes to an easy disassembly and assembly.

8) Continuous operation of about two years on a small-size silver-oxide power cell:

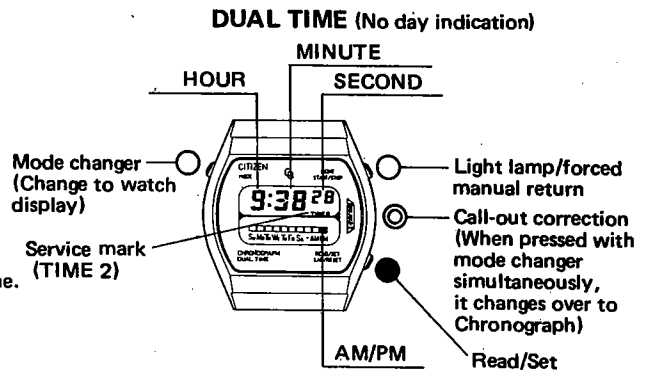
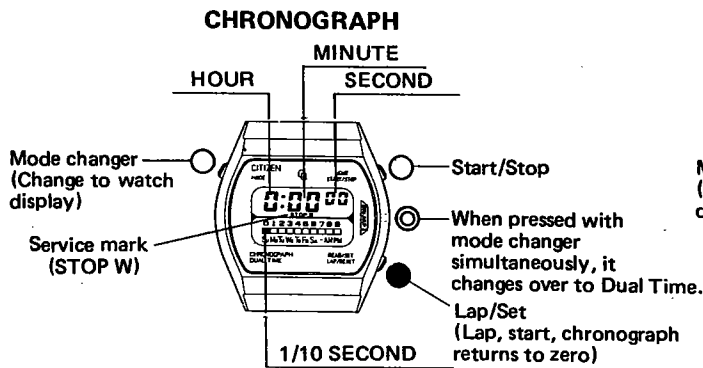
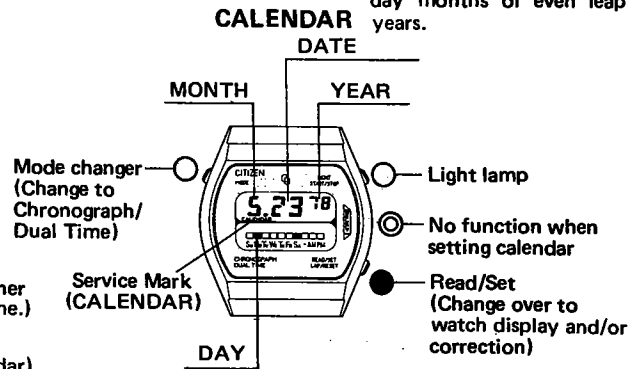
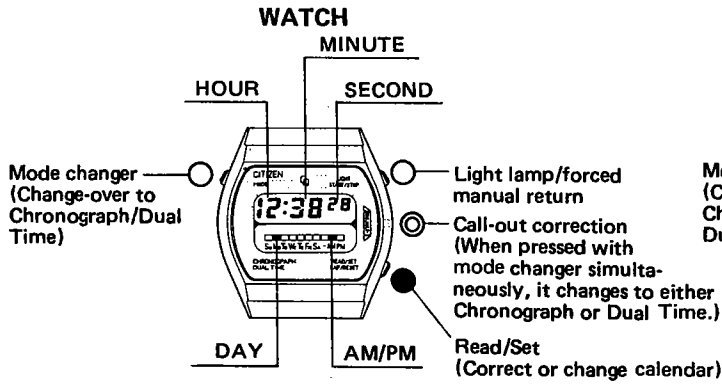
Thanks to a low power consumption at the electronic circuit, the watch can operate continuously and accurately for about two years on a single unit of small-size silver oxide power cell.

3. HANDLING INSTRUCTIONS

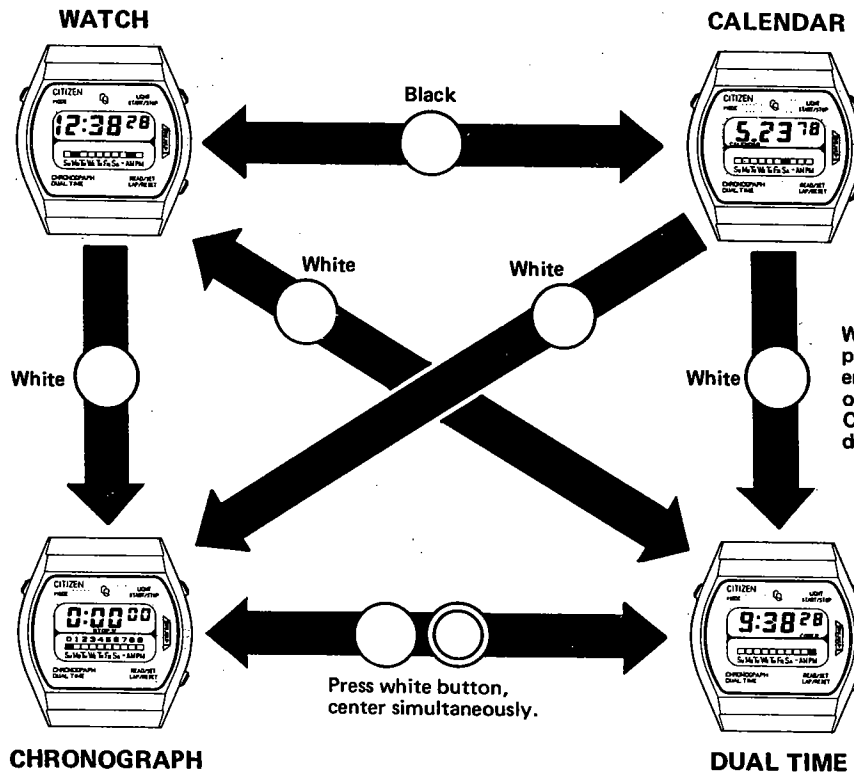
1) BASIC FUNCTIONS AND USE OF BUTTONS

Respective operation of buttons is identified by different colors.

No correction is necessary regardless 28-, 30- or 31-day months or even leap years.



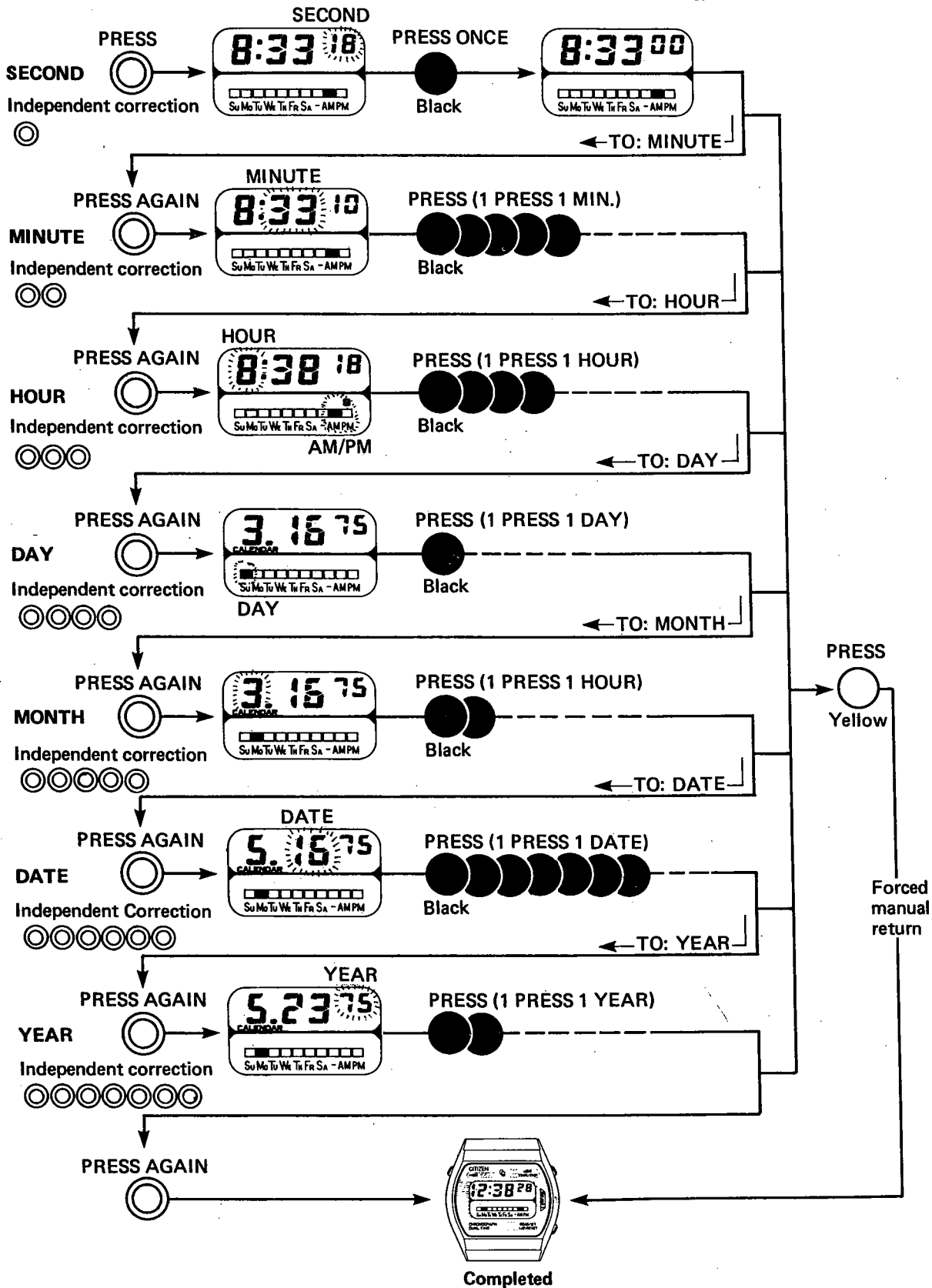
2) HOW TO CHANGE FUNCTIONS



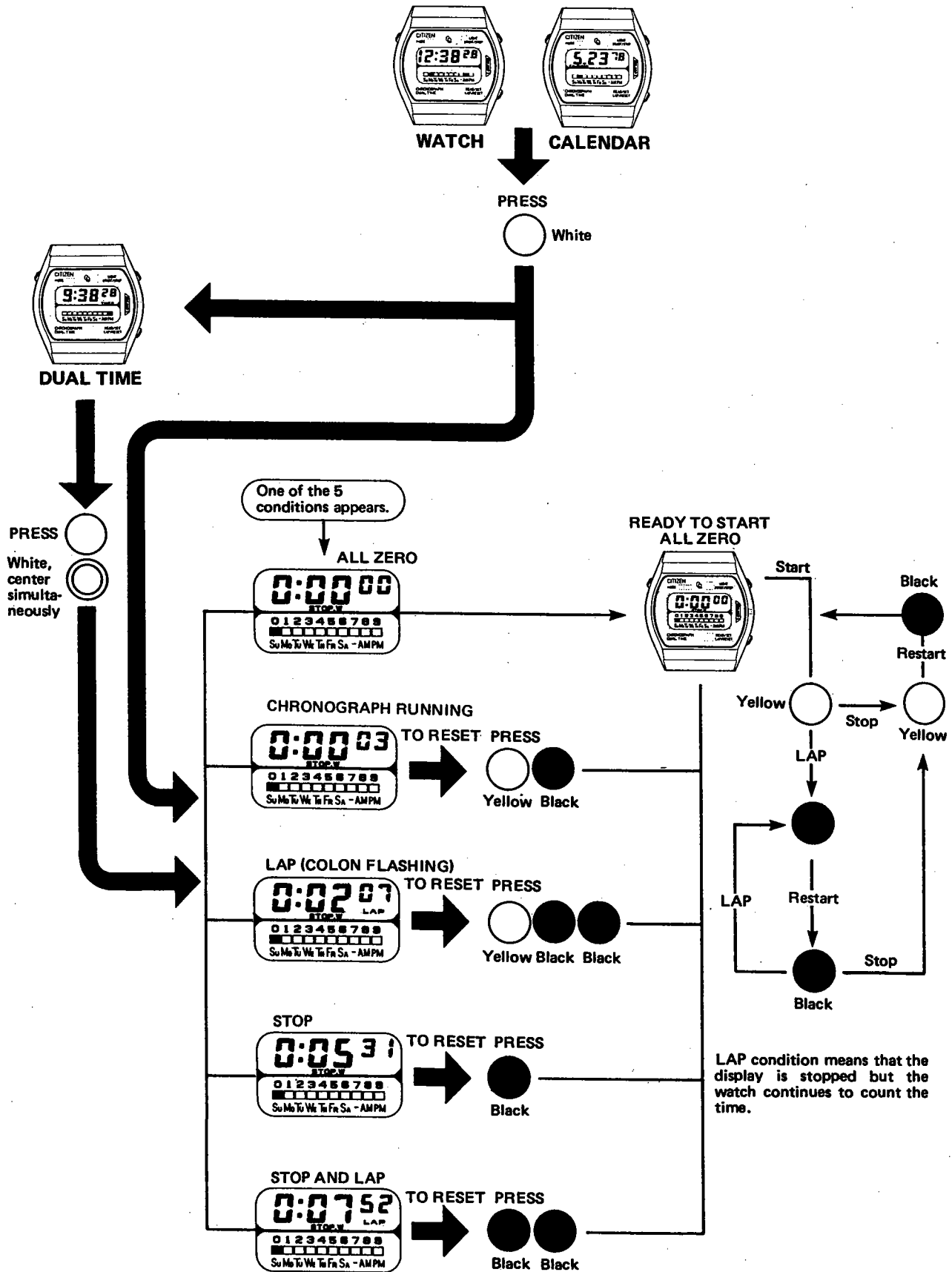
3) HOW TO ADJUST TIME CALENDAR



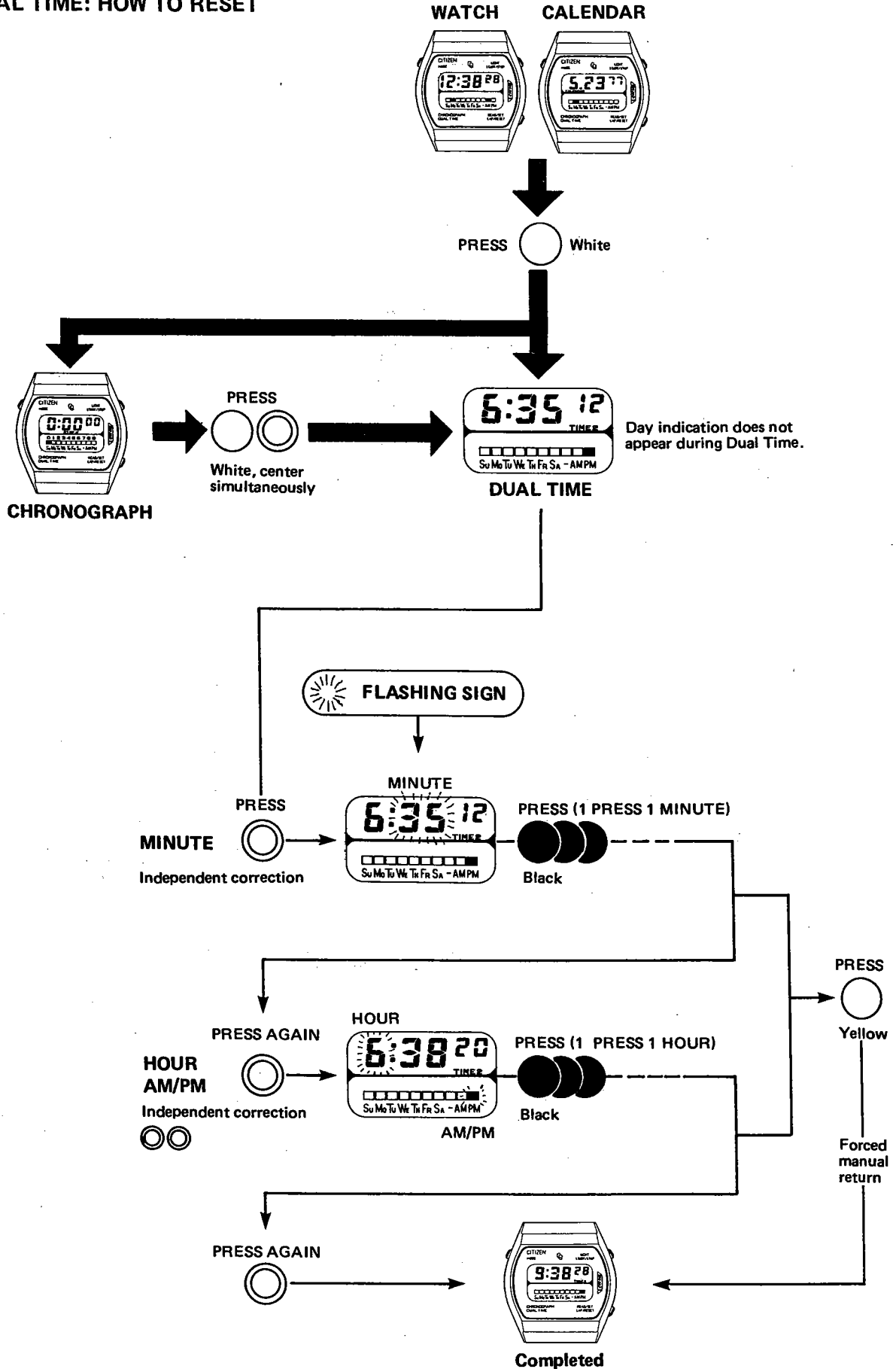
(Note) if black button is pressed when the time is indicating 30 to 59", the indicator will return to zero and will advance to the next minute.



4) CHRONOGRAPH: HOW TO RESET AND START

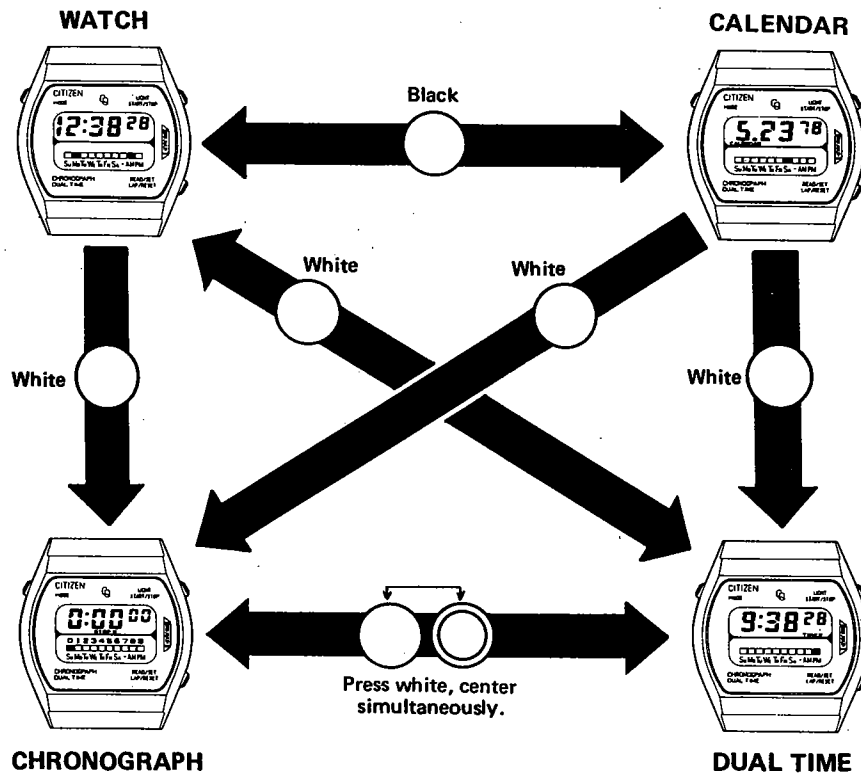
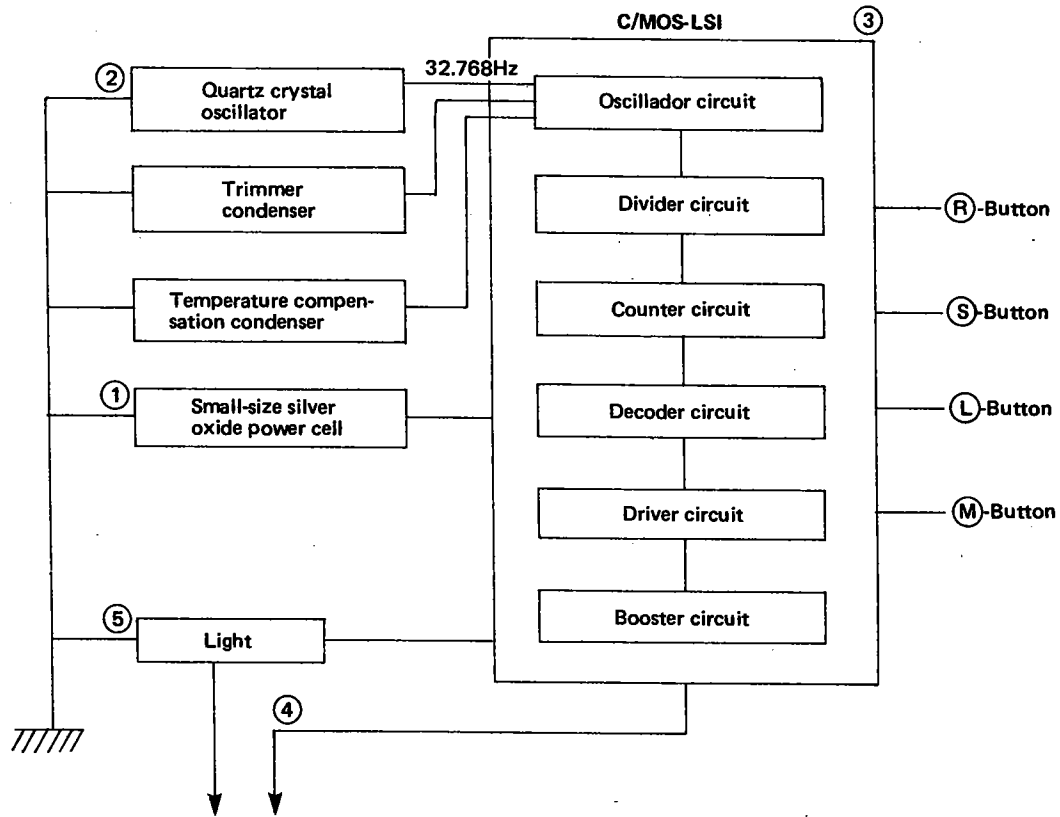


5) DUAL TIME: HOW TO RESET



4. STRUCTURE AND FUNCTION

1) Structure



2) Function

The Citizen Quartz Crystron LC Chronograph (Cal. No. 9180A) consists of ① small-size silver oxide power cell, ② quartz crystal oscillator and oscillator circuit, ③ booster/counter/driver circuit, and ④ LC display time screen. Furthermore, it incorporates ⑤ light, one of the unique additional mechanisms.

The quartz crystal oscillator provides an extremely high oscillation of 32,768Hz, which will directly be converted into an electrical signal of 32,768Hz. These electrical signals will be divided through the divider circuit down to a necessary frequency. The divided signals will then be counted by the counter circuit according to "normal time", "calendar", "chronograph" and "dual time" respectively.

The counted signals will be sent to the decoder circuit to determine which segment of a display figure the voltage should be applied to. Then, these selected signals will be amplified through the driver and booster circuits to be finally supplied to the LC display time screen.

5. SPECIFICATIONS

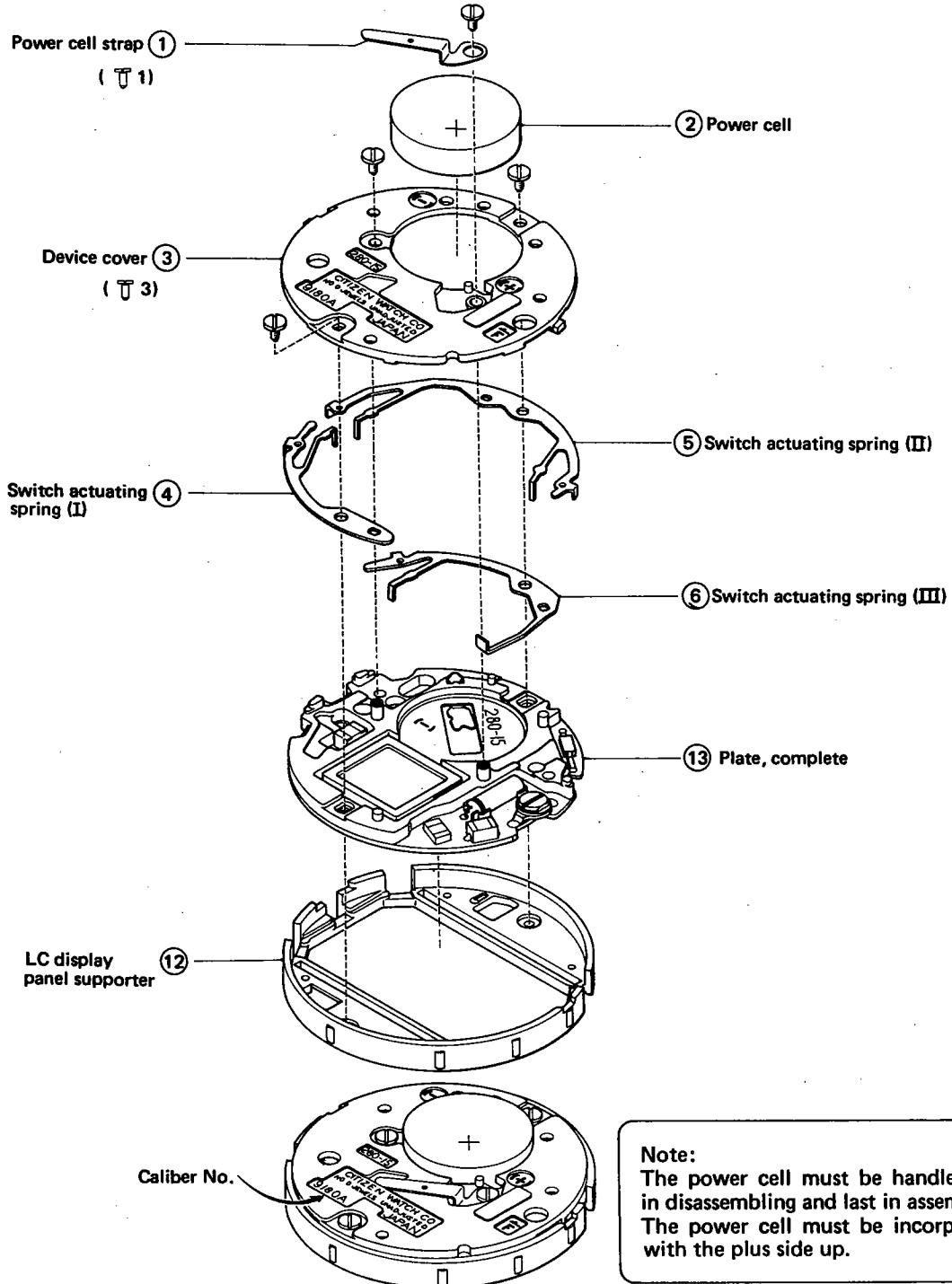
CAL. No.	9180A
Movement	Diameter: 25.7 ϕ mm Thickness: 5.0mm
Oscillation	32,768Hz
Accuracy	± 10 sec./month under normal temperature
Display information	Normal display: hour, minute, second, AM/PM, day and colon Calendar display: month, date, day and year Chronograph display: hour, minute, second and 1/10 second Dual time display: hour, minute, second and AM/PM
Display system	FE twist-type nematic LC display
Display correction	Independent correction of each digit by operation of push-buttons
Effective temperature range	0°C (32°F) – +60°C (140°F)
Semiconductor	C/MOS-LSI
Temperature compensation circuit	Temperature compensation condenser
Additional mechanisms	<ul style="list-style-type: none"> ● Illumination lamp ● Automatic calendar setting at the end of each month ● Leap-year setting mechanism ● Forced manual return
Power cell	<p>Small-size silver oxide power cell</p> <p>Parts No. : 280-15</p> <p>Voltage : 1.5V</p> <p>Capacity : 60mAH</p> <p>Size : 11.6mmϕ x 3.0mm</p> <p>Life : 2 years approx.</p>

6. DISASSEMBLY AND ASSEMBLY

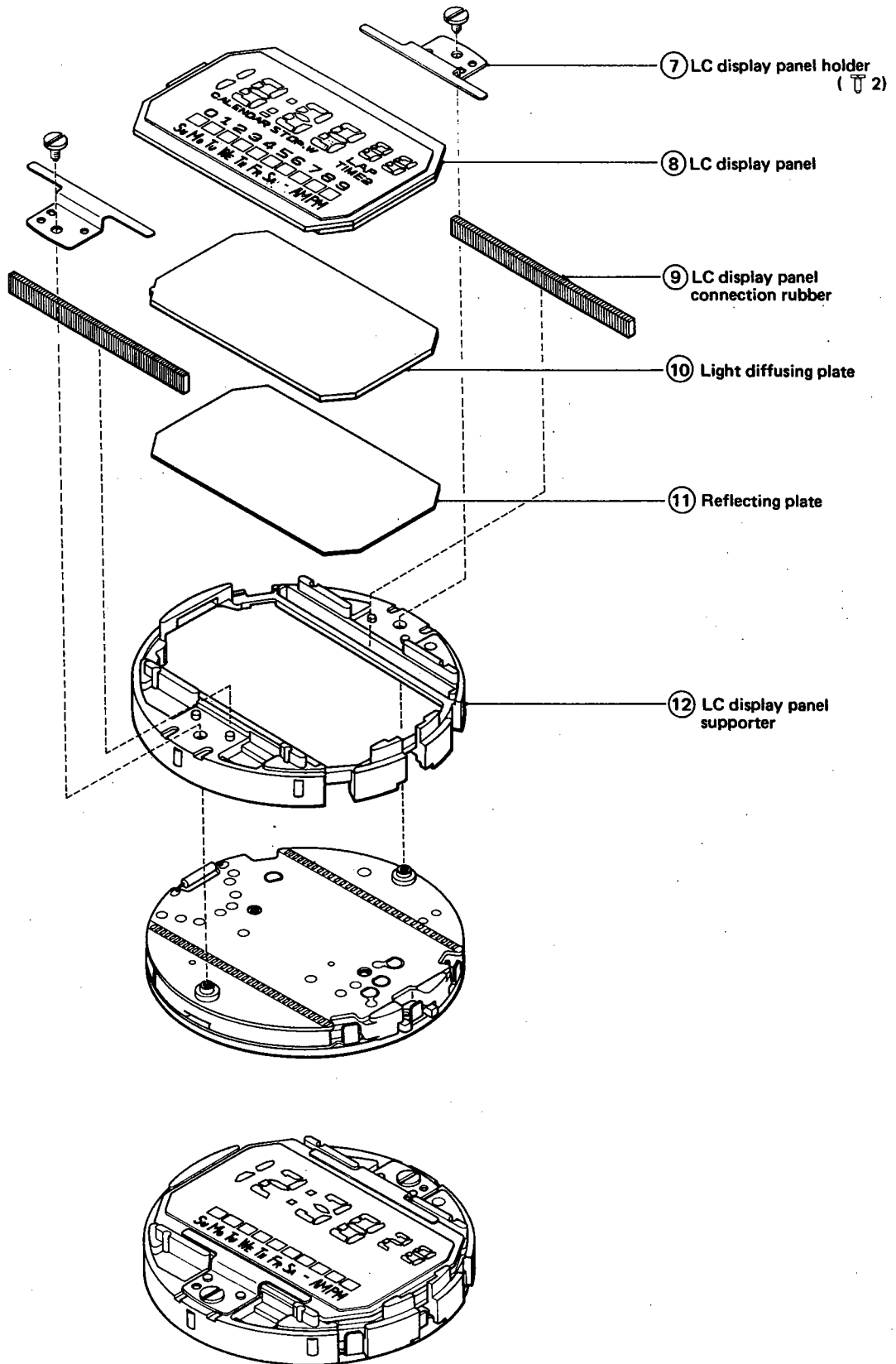
Disassembling sequence: No. ① → ⑬

Assembling sequence: No. ⑬ → ①

The number of the screw coming with the parts is shown by the symbol like (2).



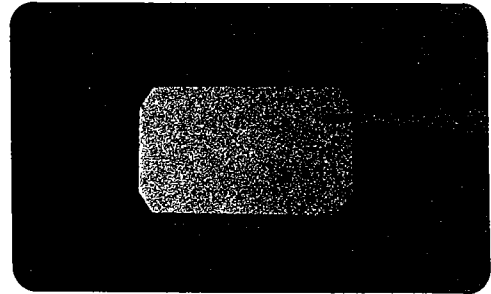
Note:
 The power cell must be handled first in disassembling and last in assembling. The power cell must be incorporated with the plus side up.



NOTES:

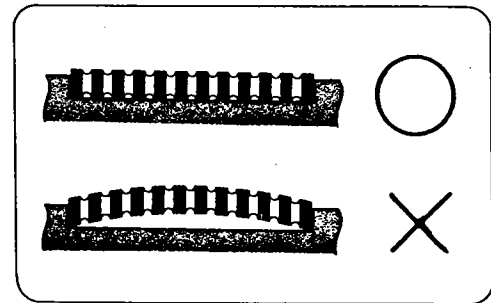
1) Handling of reflecting plate:

Hold the utmost outer circumference portion of the reflecting plate using fingerstalls or a bamboo tweezers when handling the plate in order to avoid giving flaws or stains.



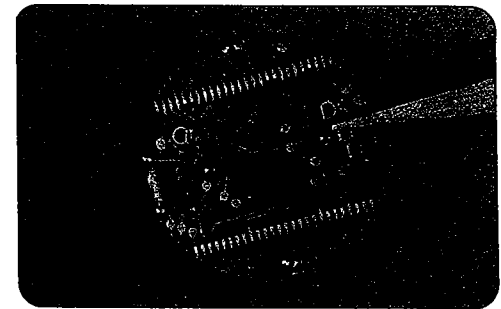
2) Handling of LC display panel connection rubber:

The LC display panel connection rubber functions to secure an electrical conduction between the LC display panel and the plate. In this connection, the rubber must be replaced with new one in case it loses its elasticity or if the rubber is stretched out to lose a good fixture with the LC display panel supporter.



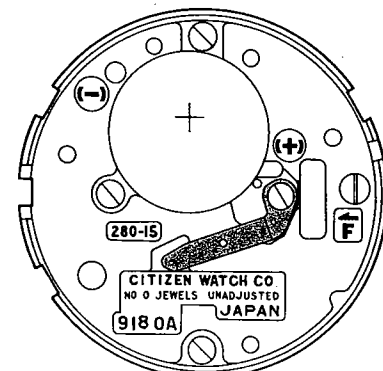
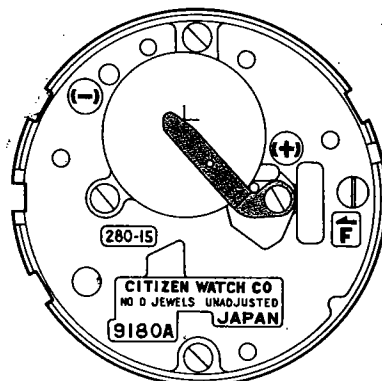
3) Handling of plate complete:

The plate of this watch is made of a polyimide substrate mixed with glass, so it must be handled with a good care not to give it flaws, cracks, etc. A special protecting treatment is applied to the plate, but the flaws caused by a metal tweezers or the finger print may deteriorate the function of the plate. Accordingly, the fingerstalls or a bamboo tweezers must be used when handling the plate.

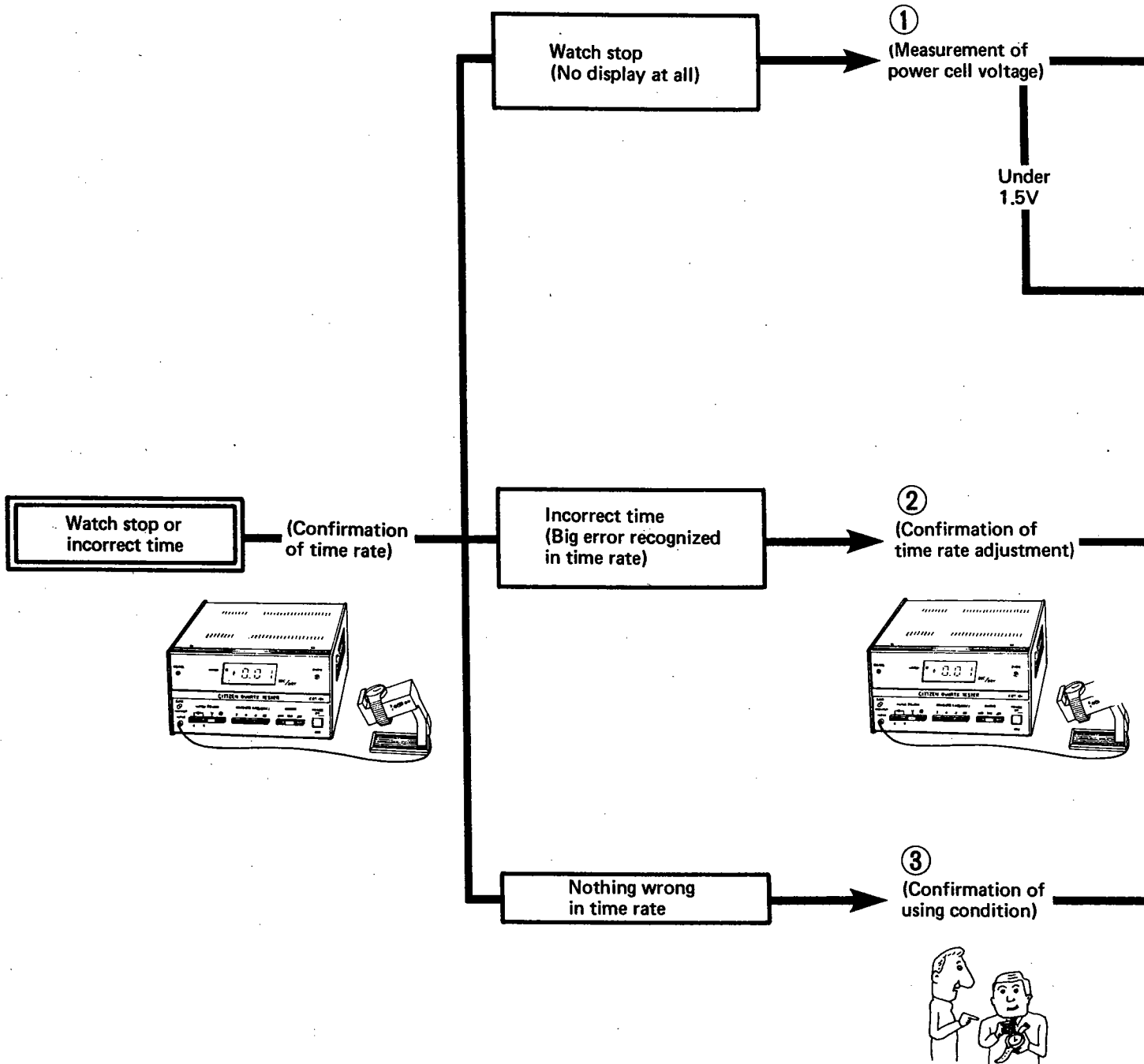


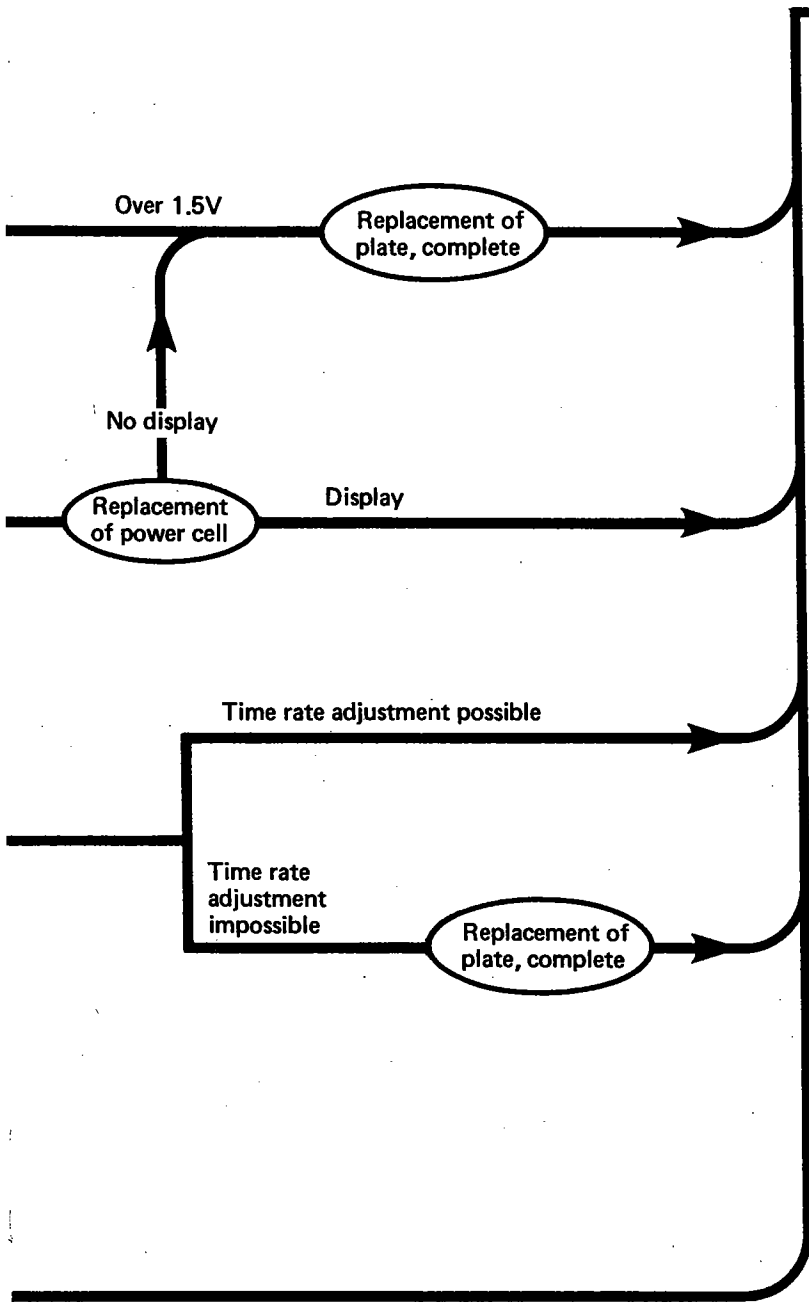
4) Handling of power cell strap:

As shown in the right diagram, the power cell strap is not holding the power cell in a completed state with appearance parts. When measuring the time rate in a state of a single state of the movement, the power cell must be fixed by turning the power cell strap as shown in the diagram.



7. TROUBLESHOOTING



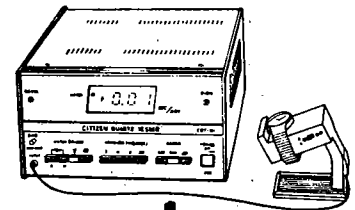


Common checking items

① (Measurement of power cell voltage)

② (Measurement of power consumption)

③ (Time adjustment)



④ (Check of appearance function)



Completion

Incomplete functioning of display and related mechanisms

Segment invisible partially

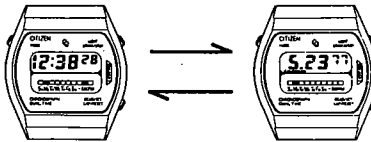
④ (Check of display panel connection section)



Incomplete functioning of additional mechanisms

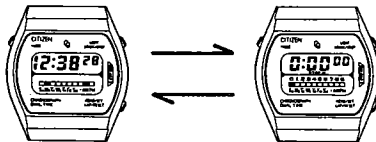
Display switching (Normal⇌Calendar) impossible

⑤ (Check of display switching mechanism (Normal⇌calendar))



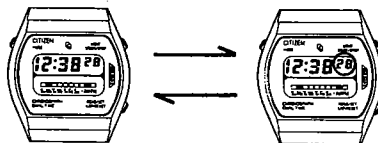
Display switching (Normal/calendar⇌chronograph/dual time) impossible

⑥ (Check of display switching mechanism (Normal/calendar⇌chronograph/dual time))



Digit selection impossible for time/calendar correction

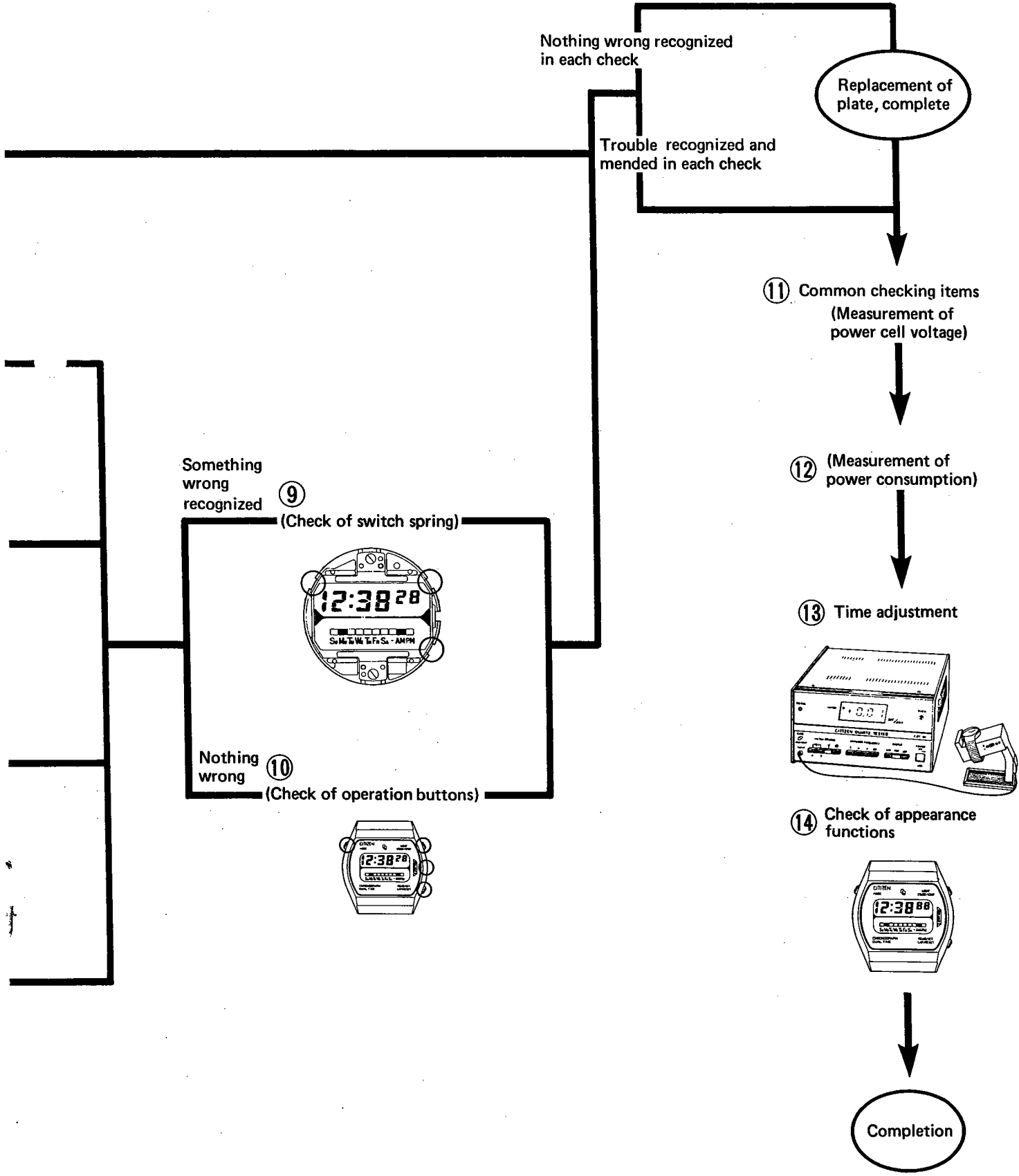
⑦ (Check of digit selection mechanism for time correction)



No lamp lighting or no operation of chronograph: start/stop

⑧ (Check of lamp lighting mechanism (Chronograph: start/stop))

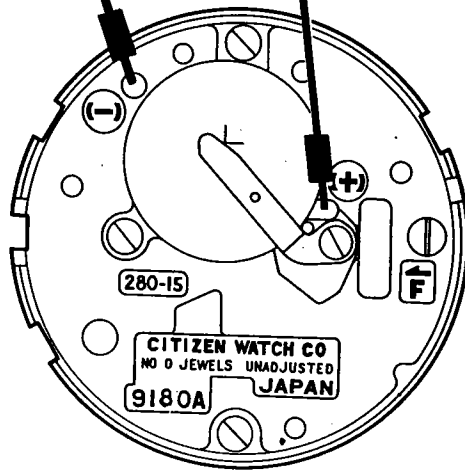
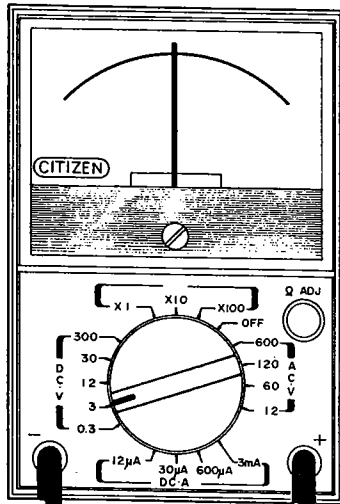




Watch stop — No display at all

1 Measurement of power cell voltage

Power cell voltage: Over 1.5V



Result and Treatment

Over 1.5V

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

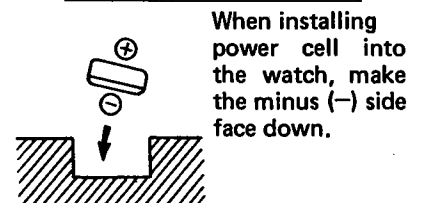
Under 1.5V

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

Caution

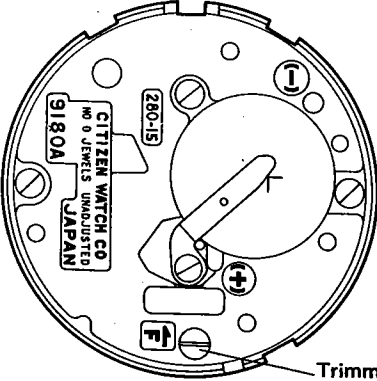
If the watch has been used more than two years, replace the power cell with the new one even if it shows more than 1.5V output power.

How to Install Power Cell

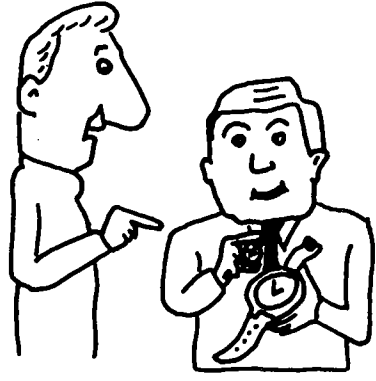


When installing power cell into the watch, make the minus (-) side face down.

Big error recognized in time rate

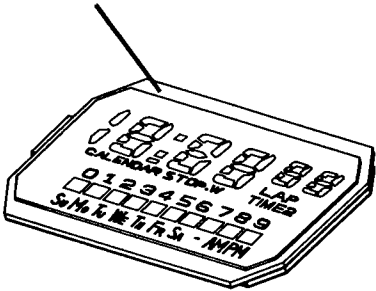
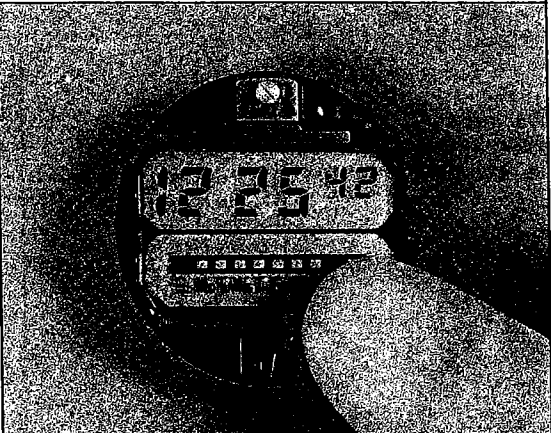
Check item	How to check	Results	Treatment
<p>2 Confirmation of time rate adjustment</p>	<p>In the case of incorrect time (big error), it is considered that the quartz crystal oscillator attached to the plate has a big error in its frequency. Conduct check by the following procedure.</p> <p>(1) Check whether the trimmer condenser is capable to adjust the time.</p>  <p>(2) In case the trimmer condenser can perform time adjustment, measure the power cell voltage.</p> <p>(3) In case the trimmer condenser is unable to adjust time, it is considered that the quartz crystal oscillator is faulty.</p> <p>Check points When a big amount of gain is recognized in the time rate measurement or there is no difference at all in the time rate even if the trimmer condenser is turned right and left, it is considered that the dielectric substance used for trimmer condenser has some cracks. In such a case, replace the plate, complete.</p>		<p>⑪ Measurement of power cell voltage</p> <p>→ Replace plate, complete</p>

Nothing wrong recognized in time rate

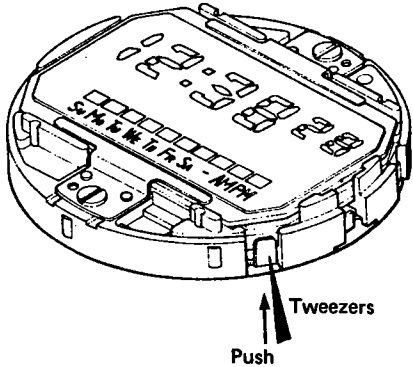
Check item	How to check	Results	Treatment
<p>3 Confirmation of using condition</p>	<p>Check how the customer has used the watch. Ex. Aren't there any mistakes in handling the watch And other factors.</p> 		

Incomplete functioning of display mechanism — Segment invisible partially

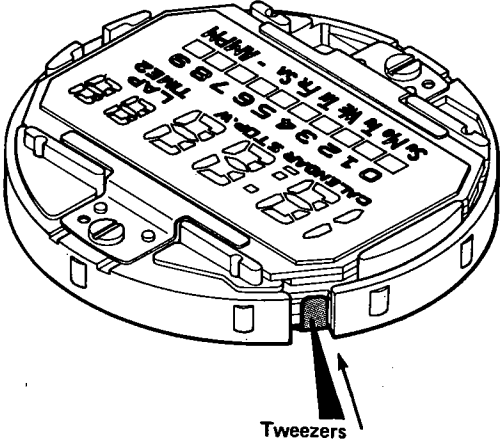
Check item	How to check	Results	Treatment
<p>4 Check of LC display panel connection section</p>	<p>For the cause of partial invisible segment, two factors are conceivable: the contact is unstable between the LC display panel and the electronic circuit; and the electronic circuit has some defects. However, the former may be more in cases, so that conduct check placing major emphasis on the contact sections.</p> <p>1. Check the screws for LC display panel holder as follows.</p> <p>(1) Aren't there any broken screws? (2) Aren't there any loosened screws? (3) Is the LC display panel holder holding the LC display panel evenly?</p> <p>2. Check the LC display panel connection rubber for electrical contact.</p> <p>(1) Isn't it twisted? (2) Isn't the rubber worn out or extremely stretched out? (3) Aren't dust or stains attached on the rubber?</p> <div style="text-align: center;"> </div> <p style="text-align: center;">LC display panel connection rubber</p>	<div style="text-align: center;"> </div> <p>Screw for LC display panel holder</p> <p>Screws broken →</p> <p>Screws loosened →</p> <p>LC display panel held unevenly →</p> <p>Rubber twisted →</p> <p>Rubber worn out →</p> <p>Dust or stains attached →</p>	<p>Replace broken screws and fasten them tight</p> <p>Tighten them again</p> <p>Refix it</p> <p>Replace the rubber</p> <p>Replace the rubber</p> <p>Remove them</p>

Check item	How to check	Results	Treatment
	<p>3. Referring the illustration below, check the LC display panel's electrode sections of segment invisible whether or not there are any dust or stains.</p> <p>Electrode section</p>  <p>Check points One quick way to check the segment partial invisible is to push softly around the segment-broken area as shown in the picture below. In this instance, if the broken segment is displayed again, it is clear that the trouble is in unstable contact. In such a case, replace the LC display panel connection rubber for electrical contact.</p>  <p>Note: Be careful not to push the LC display panel too strongly since it will break the glass.</p>	<p>Dust or stains attached →</p> <p>Nothing wrong recognized →</p>	<p>Remove them</p> <p>Replace LC display panel, even after which trouble is not solved. → Replace plate, complete</p>

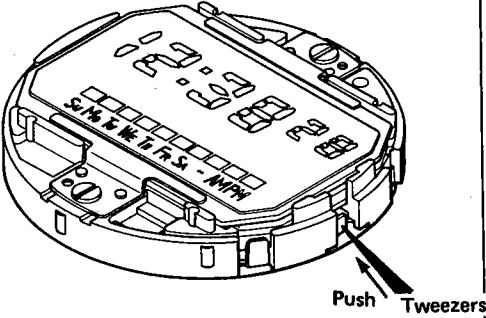
Incomplete functioning of additional mechanisms: Display switching (Normal ⇌ Calendar) impossible

Check item	How to check	Results	Treatment
<p>5 Check of display switching mechanism (Normal ⇌ calendar)</p>	<p>As for the cause of display switch incapability from normal display of "hour", "minute" "second", "day" and "AM/PM" to "year", "month", "date" and "day" calendar display, the electrical fault (some troubles in the electronic circuit) or mechanical fault (incomplete contact, deformation of parts, etc.) may be considered. Therefore, conduct a check by the following procedure.</p> <p>Take out the movement from the watchcase.</p> <p>1. Push the switch actuating spring (for display switch) with a tweezers as shown in the diagram below, and check whether the display changes correctly from the normal display of "hour", "minute", "second", "AM/PM" and "day" to the calendar display of "month", "date", "year" and "day" respectively.</p>  <p>2. Check for the mechanical factor Check whether the switch actuating springs attached to the plate complete has any deformation.</p>	<p>Display switching possible</p> <p>Display switching impossible</p>	<p>No trouble with electrical factor → ⑩ Check of push-button</p> <p>⑨ Check of switch actuating springs</p>

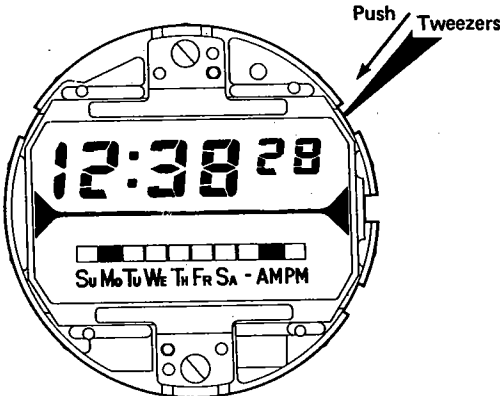
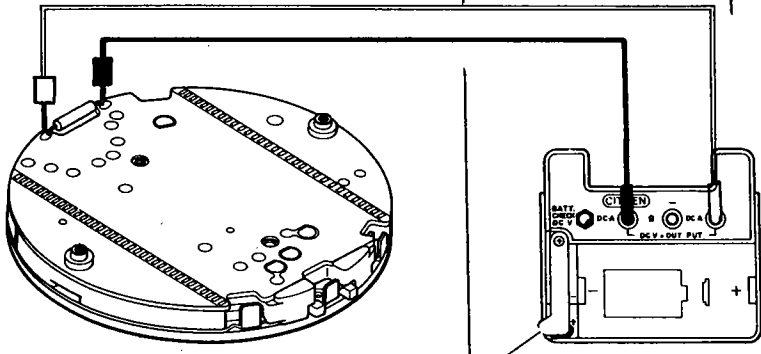
Display switching (Normal/Calendar ⇌ Chronograph/Dual time) impossible

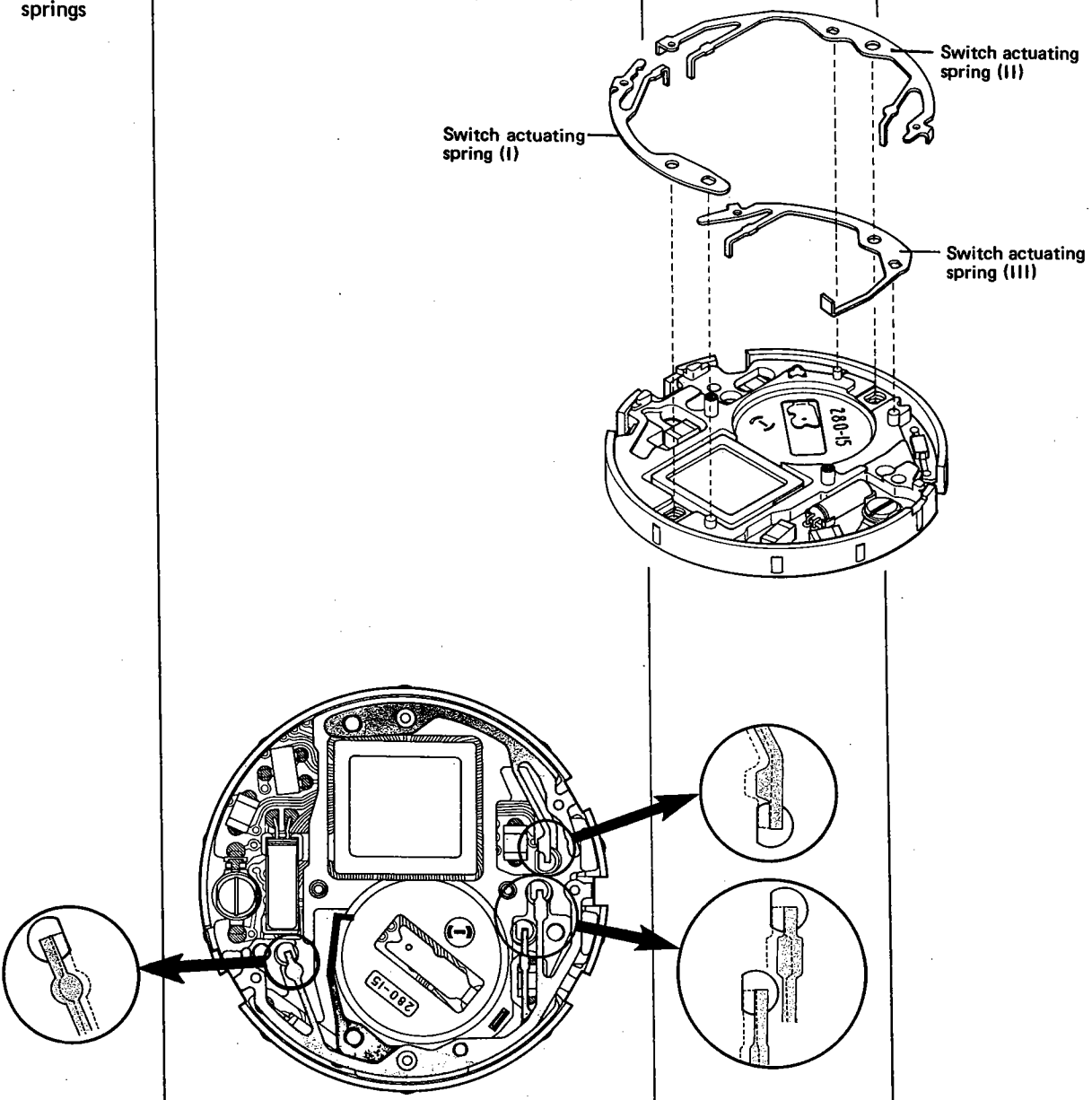
Check item	How to check	Results	Treatment
<p>6 Check of display switching mechanism (Normal/calendar ⇌ chronograph/dual time)</p>	<p>As for the cause of display switch incapability from normal time or calendar display to chronograph or dual time display, the electrical fault (some trouble in the electronic circuit) or mechanical fault (incomplete contact, deformation of parts, etc.) may be considered. Therefore, conduct a check by the following procedure.</p> <p>Take out the movement from the watchcase.</p> <p>1. Check for the electrical factor As shown in the diagram below, push the switch actuating spring (for mode switching) with a tweezers. And confirm that the normal time display/calendar display is changed correctly to the chronograph/dual time.</p>  <p>2. Check for the mechanical factor Check whether the switch actuating springs attached to the plate complete has any deformation.</p>	<p>Display switching possible →</p> <p>Display switching impossible →</p>	<p>No trouble with electrical factor → ⑩ Check of push buttons</p> <p>⑨ Check of switch actuating springs</p>


Digit selection impossible for time correction

Check item	How to check	Results	Treatment
<p>7 Check of digit selection mechanism</p>	<p>The digital selection for display correction is impossible in the following sequential order: "second" → "minute" → "hour" → "day" → "month" → "date" → "year".</p> <p>For the reason of the above inconvenience, the electrical defect (some troubles in electronic circuit) or mechanical defects (incomplete contact or parts damage) may be considered.</p> <p>Conduct a check for the above by the following procedure.</p> <p>Take out the movement from the watchcase.</p> <p>1. Push the switch actuating spring (for display digit selection) with a tweezers as shown in the diagram below, and confirm that the digit selection is possible for "second", "minute", "hour", "day", "month", "date", and "year" respectively.</p>  <p>2. Check for the mechanical system Confirm that the switch actuating springs attached to the plate complete has no deformation.</p> <p>Note: The digit selection is impossible in a calendar display state of "month", "date", "year" and "day". So the normal time display state must be secured before carrying out the above check.</p>	<p>Digit selection possible</p> <p>Digit selection impossible</p>	<p>No trouble with electrical factor → ⑩ Check of push-buttons</p> <p>⑨ Check of switch actuating springs</p>

No lamp lighting or no operation of chronograph: start/stop

Check item	How to check	Results	Treatment
<p>8 Check of lamp lighting mechanism (Chronograph: start/stop)</p>	<p>In case the illumination lamp does not light up or there is no start/stop operation of the chronograph display, check the reason for the above trouble as follows.</p> <p>1. Take the movement out of the case. Change the normal display to the chronograph display, and push the switch actuating spring (for lamp lighting) as shown in the diagram below using a tweezers. And confirm that the start/stop of the chronograph operates properly.</p>  <p>2. Check for lamp As shown in the diagram below, apply the adaptors of Citizen Multi-Tester to both terminals of the lamp attached to the plate complete. And confirm that the lamp lights up.</p> 	<p>Light possible chronograph: start/stop possible →</p> <p>Light possible chronograph: start/stop impossible →</p> <p>Light impossible chronograph: start/stop possible →</p> <p>Light impossible chronograph: start/stop impossible →</p> <p>Lamp lighting possible →</p> <p>Lamp lighting impossible →</p>	<p>⑩ Check of push buttons</p> <p>Replacement of the plate, complete (Defective IC)</p> <p>Replacement of the plate, complete (Defective IC)</p> <p>⑨ Check of switch actuating springs</p> <p>Check for switch actuating spring mechanism</p> <p>Replacement of plate complete</p>

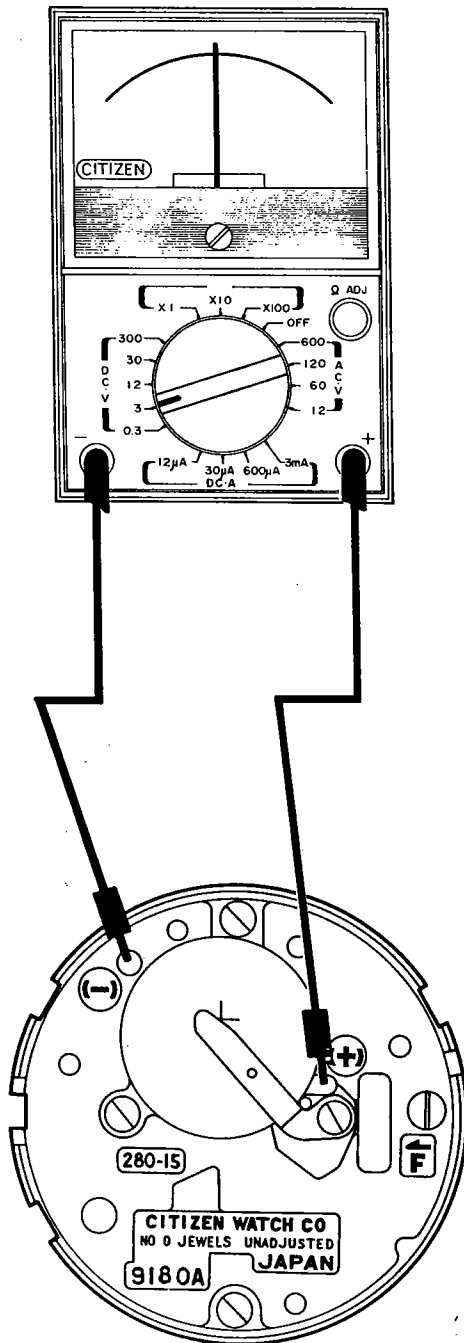
Check item	How to check	Results	Treatment
<p>9 Check of switch actuating springs</p>	<p>Check whether the connection part of switch actuating spring (I), (II) and (III) touch properly the gold-color pattern of the plate complete.</p>		

Check item	How to check	Results	Treatment
<p>10 Check of push-buttons</p>	<p>If no trouble exists in the electric system (including the electronic circuit), the mechanical system may have some troubles. So have a check in the following procedures.</p> <ol style="list-style-type: none"> 1. Have a check for L-light button, S-select button, R-read/set button, and M-mode switching button respectively. <ol style="list-style-type: none"> 1) Check whether each of the push-buttons has a smooth action. 2) Check whether each push-button has some dust or stains stuck. 3) Check whether each push-button has some bend or other deformations. <p>Note: The check of 2) and 3) must be carried out with the push-buttons removed from the case.</p>	<p>M-Mode switching button</p>  <p>Dust or stains stuck</p> <p>Button deformation or breakage</p>	<p>Removal</p> <p>Replacement of push-buttons</p>

Common checking items

11 Measurement of power cell voltage

Power cell voltage: Over 1.5V



Result and Treatment

Over 1.5V

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

Under 1.5V

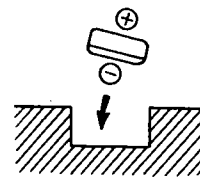
- Power cell is replaced:
- Correct display of LC display panel
→ ⑫ Measurement of power consumption
 - No display of LC display panel
→ Replace plate.

Caution

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.

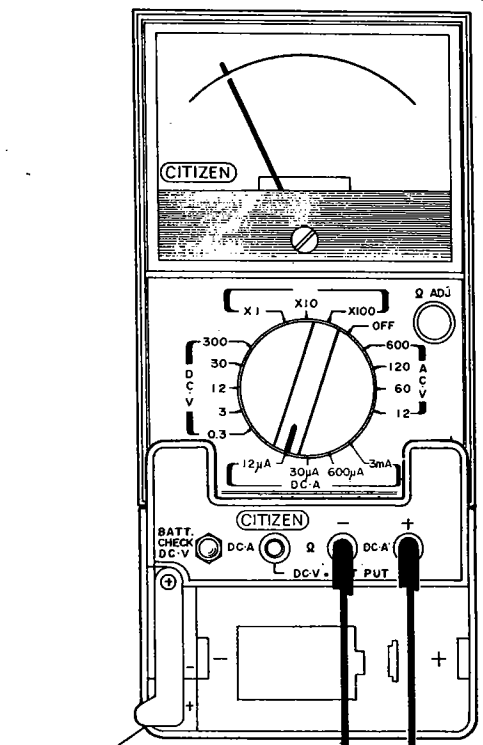
How to Install Power Cell

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

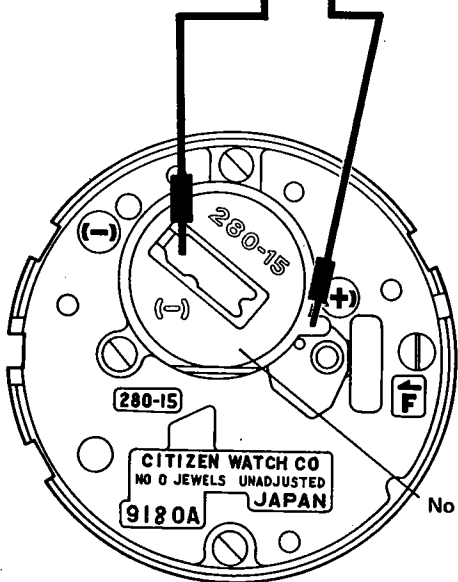


12 Measurement of power consumption

Power consumption = Under $4.0\mu A$



Power cell



No power cell installed.

Result and treatment

(1) Measurement under normal condition:

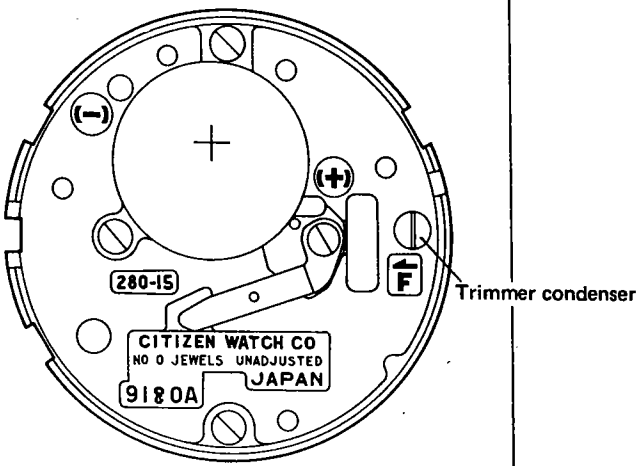
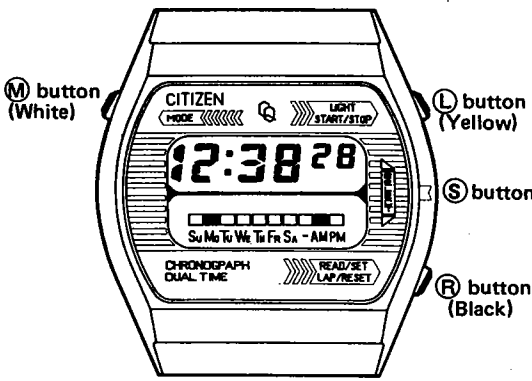
- Under $4.0\mu A$ → ⑬ Time adjustment
- Over $4.0\mu A$ → ② Measurement of power consumption of electronic circuit section

(2) Measurement of power consumption of electronic circuit section with LC display panel removed:

- Under $2.0\mu A$ → Replace LC display panel connection rubber for electrical contact or LC display panel.
- Over $2.0\mu A$ → Replace plate, complete.

Note

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

Check item	How to check	Results	Treatment
<p>13 Time adjustment</p>	<p>Set the microphone for liquid crystal to Quartz-timer and measure the time rate.</p>  <p>The time rate adjustment can be performed by turning right or left the head of the screw of the trimmer condenser.</p>		
<p>14 Check of appearance functions</p>	<p>Check the appearance functions such as display condition of the time screen, quick setting of each display etc.</p> 		

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