

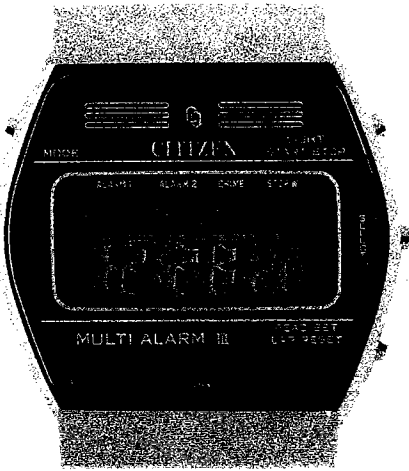
***TECHNICAL
INFORMATION***

CITIZEN QUARTZ

Cal. No. 924 ※ ※

 **CITIZEN**

§ 1. OUTLINE



This is a digital quartz watch for gentlemen, featuring the glass vibrating method applied to the alarm as well as a slim and smart design. Furthermore, a reasonable price is realized with this watch in spite of its multiple functions.

§ 2. FEATURES

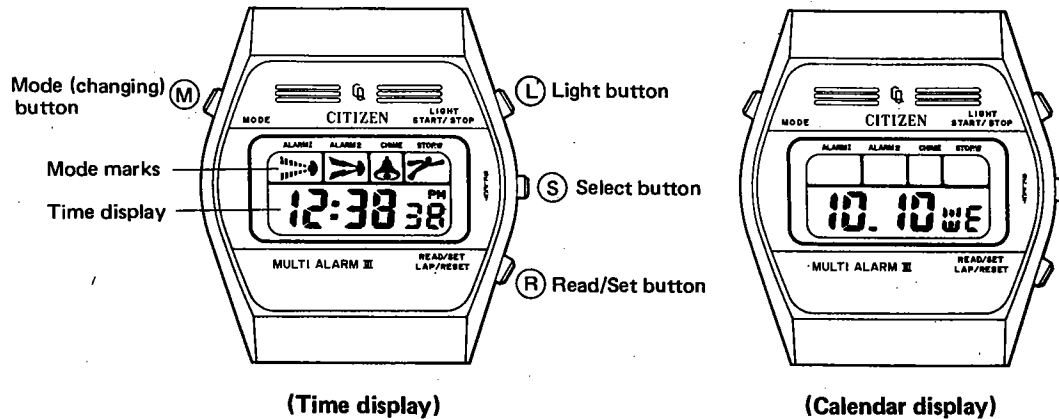
- 1) With adaption of the glass vibrating method of alarm along with the compact appearance design, the thickness of the movement has been reduced even more down to 3.95mm for the multi-function digital watch with alarm.
- 2) An independent use is possible among four functions: alarm-I, alarm-II, chime and stopwatch. The "service marks" (mode marks) facilitate at a glance knowing of set or non-set for each function under the time display. The symbols "ON" and "OF" show the set or cancel of functions in each mode.
- 3) The following sound-related functions are available: two alarms featuring different tones; the chime which gives the buzzer sound twice every hour on the hour; the sound which confirms the start/stop with every operation of (L) button; and the sound monitor which confirms the electronic tone at the time display.
- 4) For the stopwatch function, the display method for the level of 1/100 sec. draws like an oblong and then the timing is shown in figures on the screen at the end of timing.
- 5) The selection is possible between the 12-hour and 24-hour displays in correction of the time display. And the displays of two alarms are linked to the 12/24-hour display of the time mode.
- 6) The following devices are added.
 - Fully automatic calendar (including leap year) (The years can be set in the cycle of 1970~ 2009.)
 - Power cell life indicator (The colon of the time display flashes when the life of the power cell comes near its end.)
 - Illumination lamp (For facilitated reading of the display information on the screen in the dark)

§3. SPECIFICATIONS

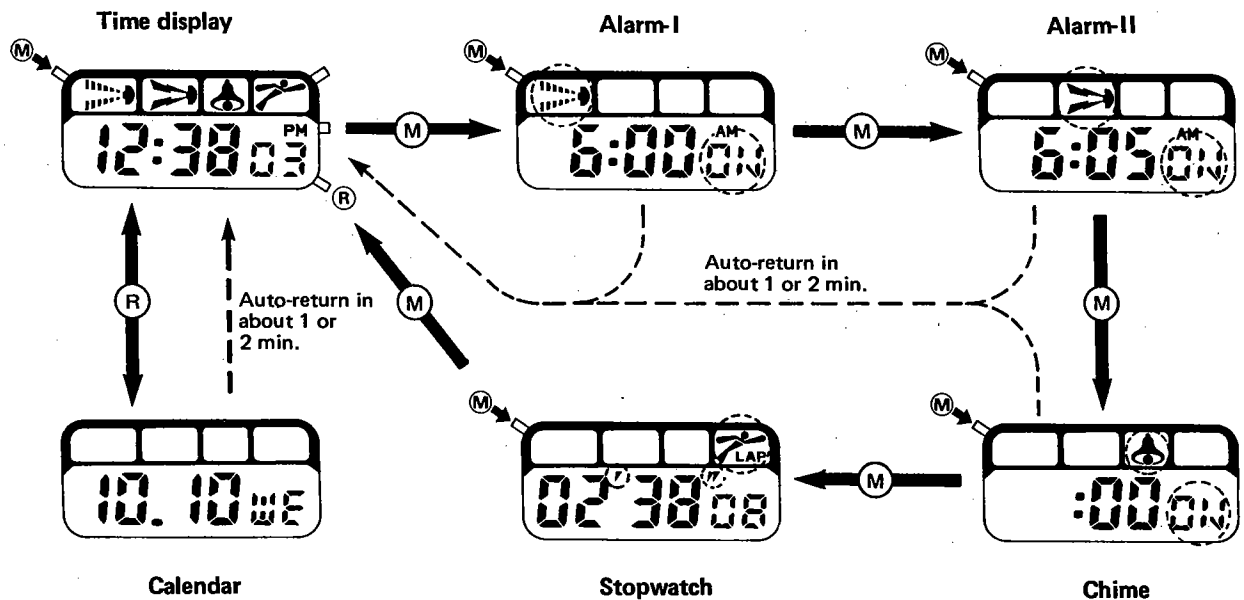
Caliver No.	9240A	
Type	Digital-type quartz crystal watch (LC display)	
Movement	Size:	27.1mm ϕ
	Thickness:	3.95mm
Oscillation	32,768 Hz	
Accuracy	± 15 sec./month at normal temperatures	
Display method	FE twist-type nematic LC display (Matrix driving)	
Display information	Time	"Hour" (switching between 12-hour with AM/PM and 24-hour displays at setting time), "minute" and "second"
	Calendar	"Month", "date", "day" and "year" (at setting time)
	Alarm-I	"Hour", "minute" and "AM/PM" } linking to time system of time display with no display of "AM/PM" in 24-hour display
	Alarm-II	
	Time signal	" :00" minute
	Stopwatch	"Minute", "second", "1/100 sec." and "lap" mark (Continuous timing possible up to 59'59"99)
Correction of display	Independent correction for each digit by push-button operation	
Effective temperature range	0°C ~ +60°C (+32°F ~ 140°F)	
Integrated circuit	C/MOS-LSI (1 unit)	
Additional functions	<ul style="list-style-type: none"> • Alarm-I • Alarm-II • Chime • Stopwatch • 12-/24-hour display switch 	<ul style="list-style-type: none"> • Fully automatic calendar (Including leap year) • Power cell life indicator • Instant manual return • Alarm monitor • Illumination lamp
Power cell	Silver oxide power cell (1 unit) Parts No. : 280-13 Nominal voltage : 1.55V Capacity : 45mAH Size : 7.9mm ϕ x 3.6mm Life : About 2 years	

§ 4. HANDLING INSTRUCTIONS

1) Name of each parts



2) Display switching (Each mode set)



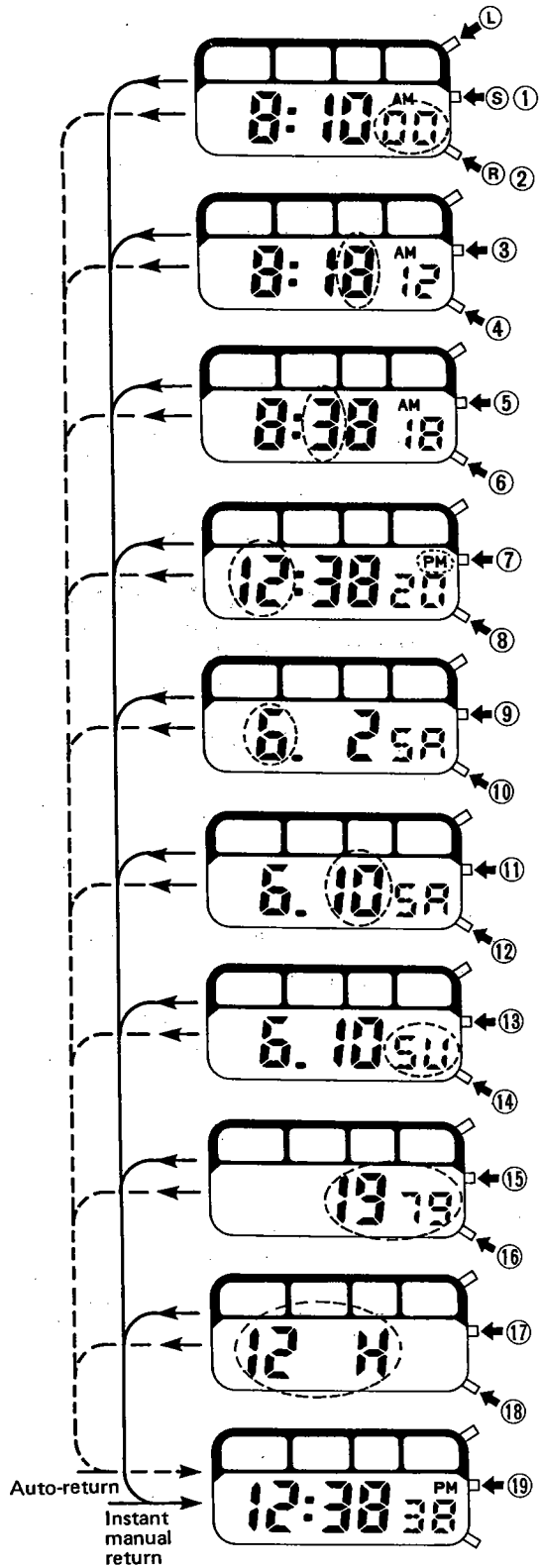
- With every push of (R) button, the time display and the calendar display switch alternately. The calendar display returns to the time display automatically in 1 ~ 2 minutes.
- The display is changed in that order of alarm-I → alarm-II → chime → stopwatch → time display with every push of (M) button. The auto-return mechanism also functions here to return the time display from each mode of the alarm-I, alarm-II and chime.
- Either one of the 12-hour and 24-hour displays is given for the time display which can be selected when the time or calendar is corrected.
- The alarm time can be set in either of the 12-hour and 24-hour displays in linking to the time system of the time display. No display of AM/PM is given in the 24-hour display.

3) Setting of time and calendar

The area to be corrected is called out with push of (S) button, and then the setting is performed with push of (R) button.

The setting must be carried out as indicated by the figures in the illustration below (① → ② → ③ ... ⑱).

(The correcting area is shown by the ○ mark.)



Setting of second

Setting of 1-minute digit

Setting of 10-minute digit

Setting of hour

Setting of month

*Setting of date

Setting of day

Setting of year

12-/24-hour switching




Time display

- ① With push of (S) button about 2 seconds under the time display, the "second" flashes.
- ② The time is reset to "0-second" with push of (R) button. (One minute is carried when the "second" reads 30 ~ 59.)
- ③ The "1-minute digit" flashes.
- ④ The time is carried by one minute with every push of (R) button, and thus the "1-minute digit" is set.
- ⑤ The "10-minute digit" flashes.
- ⑥ The "10-minute digit" is set.
- ⑦ The "hour" plus either "AM" or "PM" flash simultaneously.
- ⑧ The "hour" plus "AM" or "PM" are set.
- ⑨ The "month" flashes.
- ⑩ The "month" is set.
- ⑪ The "date" flashes.
- ⑫ The "date" is set.
- ⑬ The "day" flashes.
- ⑭ The "day" is set. (Each day of the week is shown in English with first two letters.)
- ⑮ The "year" flashes.
- ⑯ The "year" is set. (The years can be set in the cycle of 1970 ~ 2009.)
- ⑰ Either "12-hour" or "24-hour" display is given with flashing.
- ⑱ The "12-hour" and "24-hour" displays are given alternately with every push of (R) button, which couples the display time system of the time display.
- ⑲ The time display is reset.

*For setting of "date" of the leap year (February 29), the "year" must be set first.

Auto-return
Instant manual return

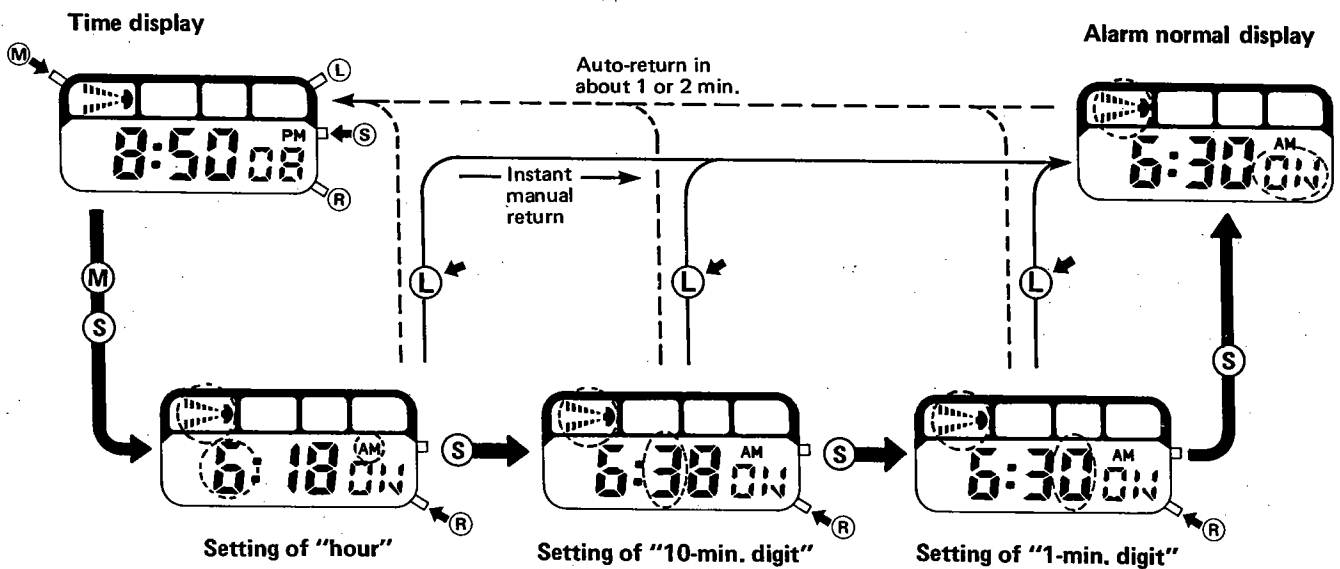
4) Operation of Alarm-I

-  : Alarm-I mode mark (Displayed constantly in the mode of alarm-I with flashing.)
 : ON-mark (Showing the alarm set state)
 : OFF-mark (Showing the alarm cancel state)

(1) Call-out of alarm-I mode and return to time display

The time display is switched to the alarm-I mode with a push of (M) button, and then the time display is reset with continuous 4-times push of (M) button from the "alarm normal display" after setting of the alarm. Also, the time display is reset automatically in about 1 or 2 minutes from the alarm-I mode.




(2) Setting of alarm-I



• Time setting sequence: "Hour" → "10-min. digit" → "1-min. digit"

• The "set" and "cancel" of the alarm are repeated alternately with every push of (R) button with display of "ON" and "OFF" marks respectively. These marks don't flash in the setting state.

5) Operation of Alarm-II

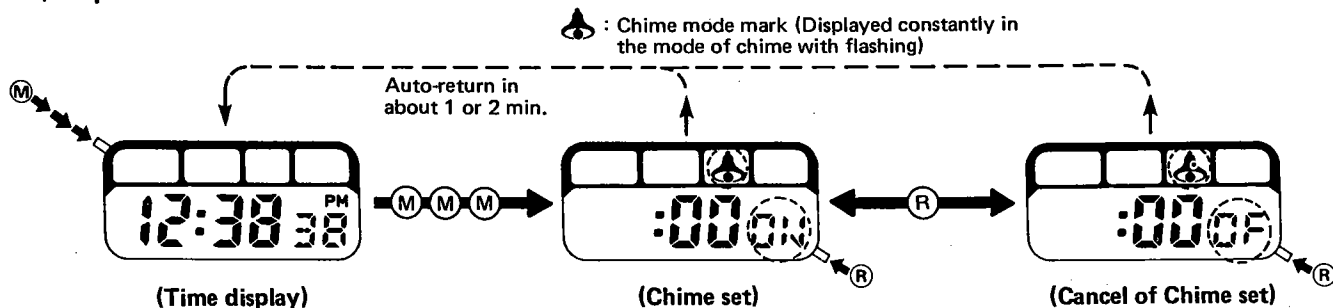
-  : Alarm-II mode mark (Displayed constantly in the mode of alarm-II with flashing)
 : ON-mark
 : OFF-mark (Identical with alarm-I)

1) Setting of alarm-II

Exactly identical with alarm-I except for the mode mark.

* Both alarm-I and alarm-II sound for 30 seconds and are stopped with push of any of the push-buttons.

6) Operation of Chime



(1) Call-out of chime mode and return to time display

The time display is switched to the chime mode with continuous 3-times push of M button, and reset from the chime mode with push of M button twice. The time display is also reset automatically from the mode in about 1 or 2 minutes.

(2) Set/Cancel of chime

The "set" and "cancel" of the chime are indicated with "ON" and "OFF" marks each with flashing.

7) Operation of stopwatch

: Stopwatch mode mark (Displayed constantly in the mode of stopwatch with flashing)

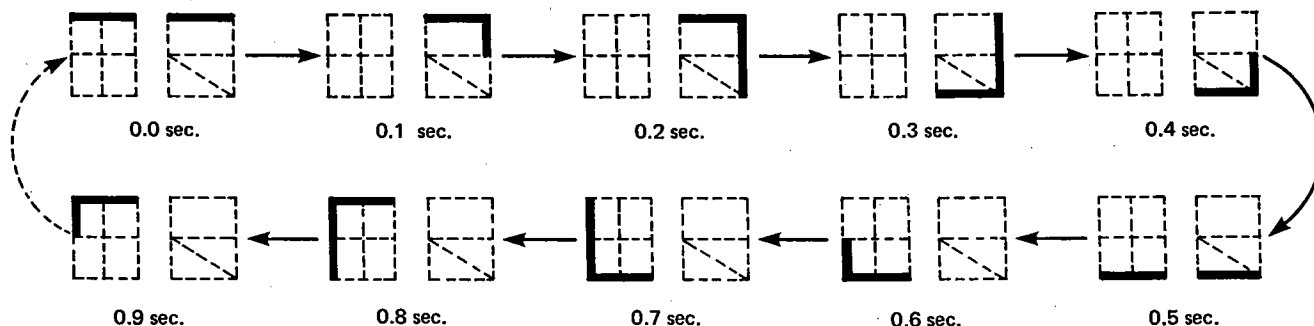
LAP : Lap mark (Displayed at the lower right of the stopwatch mode like with no flashing)

: Minute, Second digit mark (The mark " / " and " // " show the digits of minute and second each, and flash in the "run" mode (run/lap run).)

(1) Call-out of stopwatch mode and return to time display

The time display is switched to the stopwatch mode with continuous 4-times push of M button, and reset from the stopwatch mode with a push of M button. The auto-return mechanism is not available from the stopwatch mode to the time display, and thus M button is pushed to reset the time display.

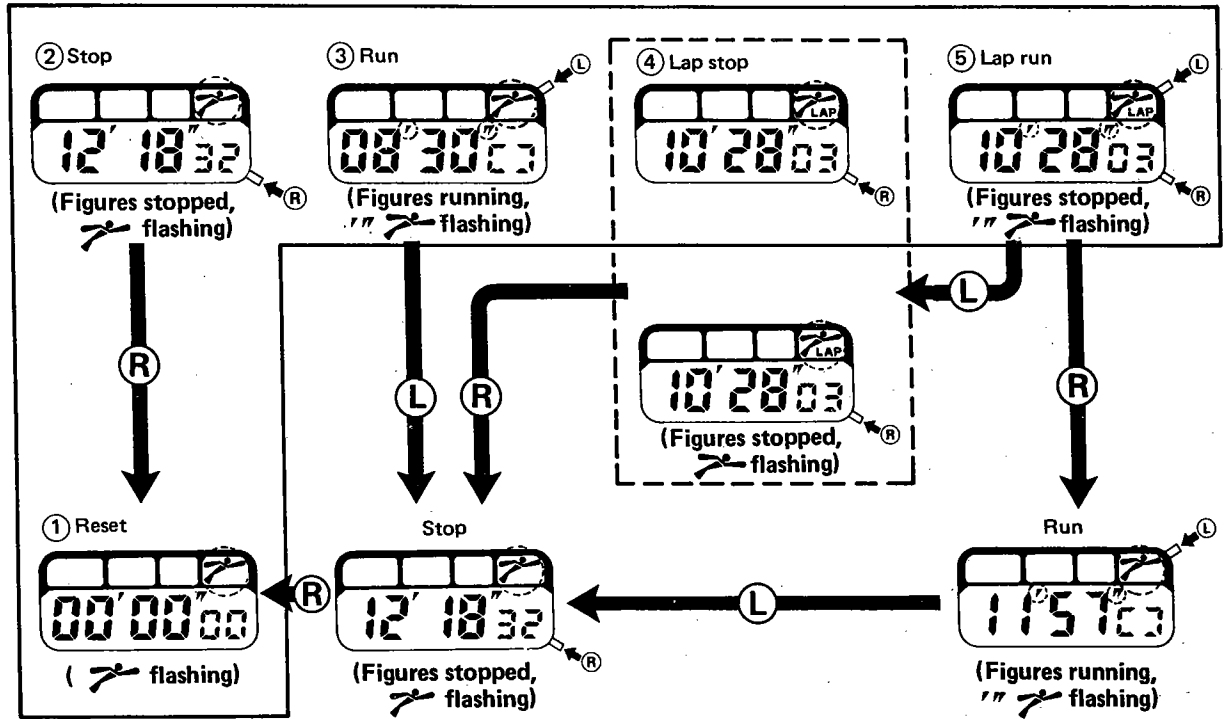
(2) Display method of 1/100 sec. under running of stopwatch



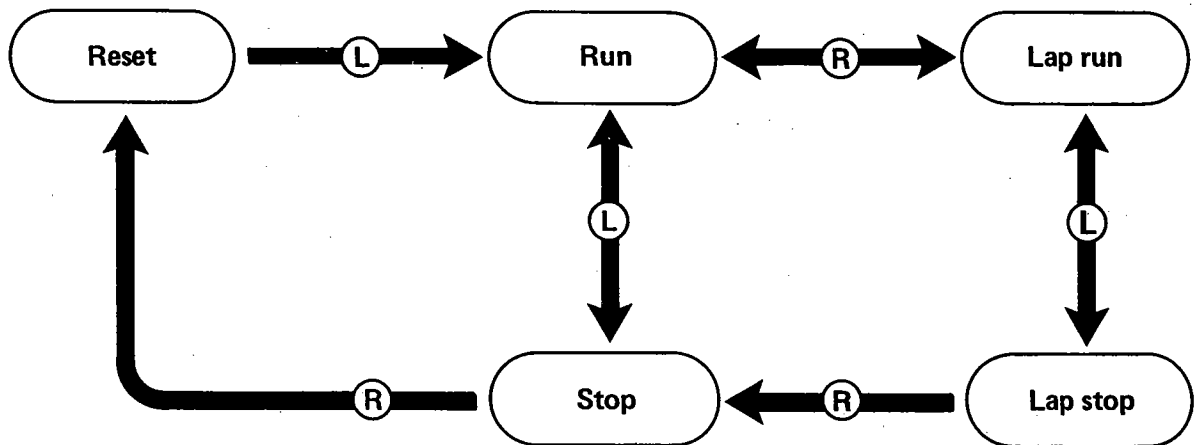
As illustrated above, the display changes every 0.1 sec. Thus, the display varies as if it drawn an oblong in one second. When the display change stops, the time of 1/100 sec. is shown in figures.

(3) Resetting

The display is shown in the following five modes when the time display is switched to the stopwatch display. And each mode is reset with operation of the push-buttons.

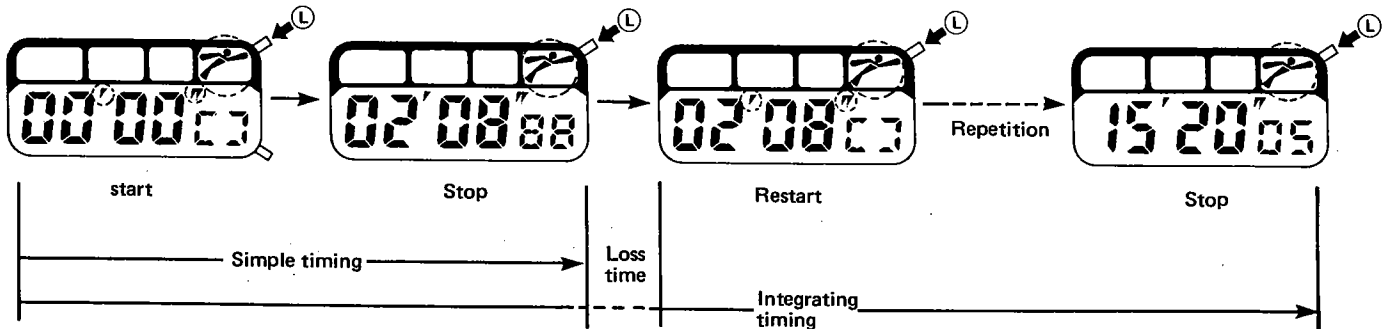


(4) Switching to each mode under stopwatch mode

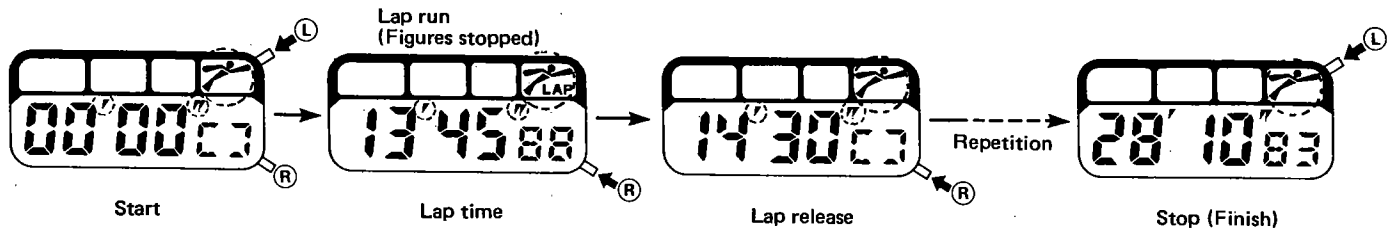


(5) Simple timing and integrating timing

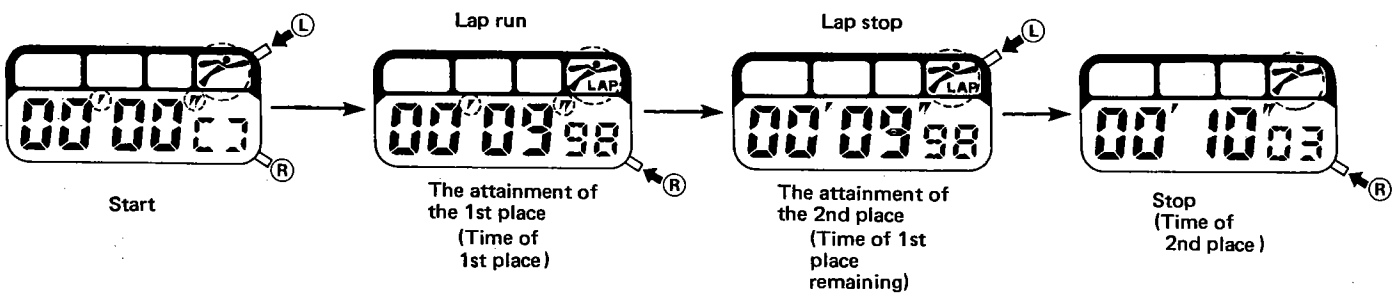
The "start" and "stop" of the timing are repeated alternately with every push of (L) button, and thus an integrating timing is possible for 59' 59" 99 in all. After this, the reset mode is given to Start timing again. Then the timing is carried out repeatedly until it is stopped.



(6) Timing of lap time



(7) Timing of 1st and 2nd places



- A confirmation sound inform for start/stop with every push of (L) button. on.
- As in the case of the stopwatch mode, the illumination lamp glows with push of (L) button in other modes.
- The timing is continued even though the function is switched to another mode under timing (run and lap run modes). And the stopwatch mode mark () is displayed when the display is switched to the time display.

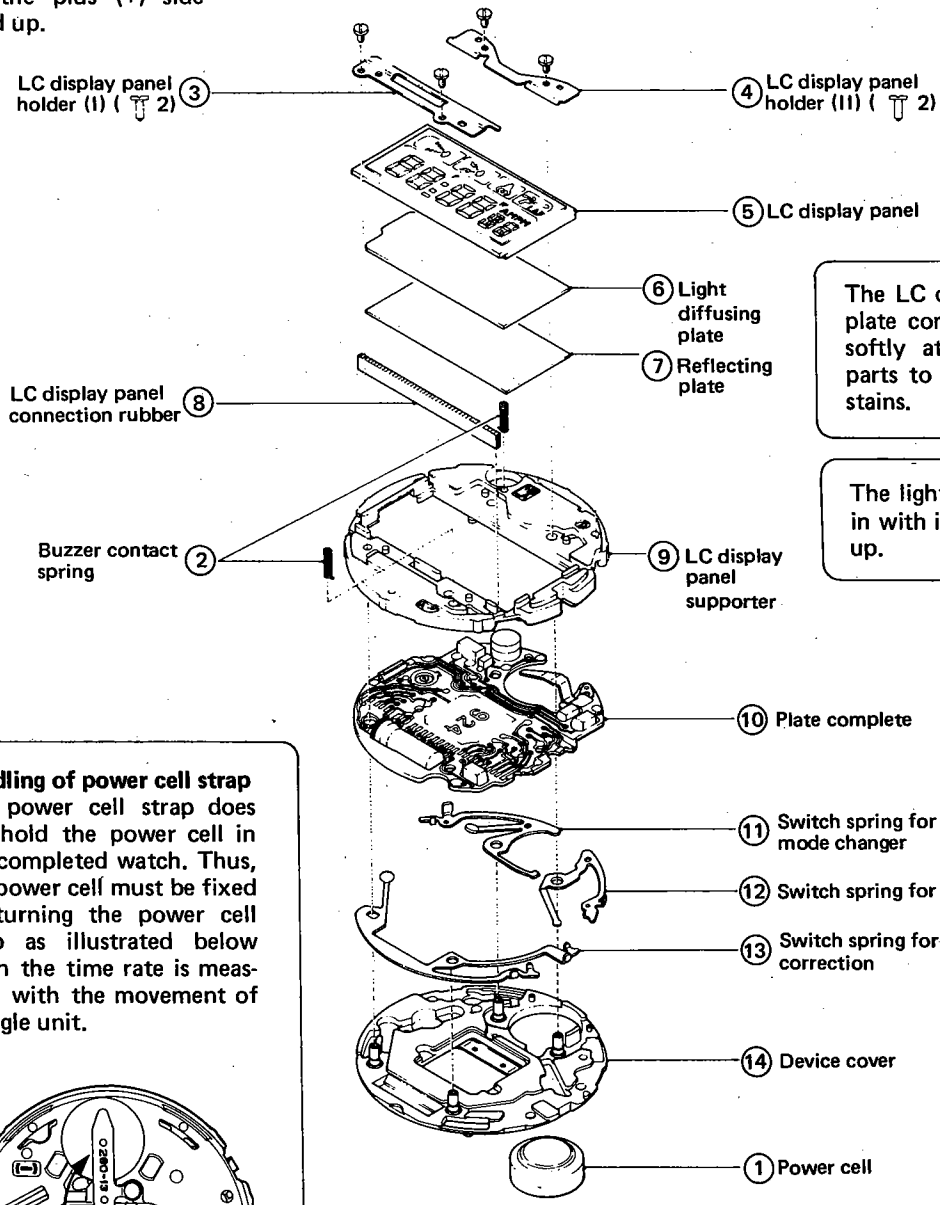
§5. DISASSEMBLY/ASSEMBLY OF MOVEMENT

Disassembling sequence: ① ~ ⑭
 Assembling sequence: ⑭ ~ ①
 The number of screws coming with the parts is shown by the symbol like (④ 2).

•Notes on assembly

- 1) The power cell is disassembled first and assembled last each.
- 2) The power cell is put in with the plus (+) side turned up.

•Note
 Refer to the following page for attachment/detachment of the buzzer contact spring.



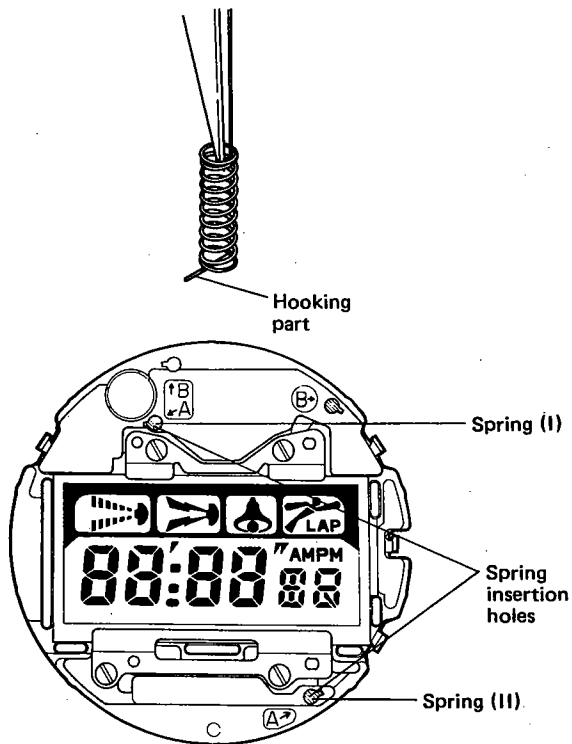
The LC display panel and the plate complete must be held softly at their utmost edge parts to avoid giving flaws or stains.

The light diffusing plate is set in with its ground face turned up.

•Handling of power cell strap
 The power cell strap does not hold the power cell in the completed watch. Thus, the power cell must be fixed by turning the power cell strap as illustrated below when the time rate is measured with the movement of a single unit.

Avoid washing the electronic parts, but the dust or stains sticking to the parts must be cleared away to secure good contact. No lubrication is required to the movement.

● Attachment/detachment of buzzer contact spring



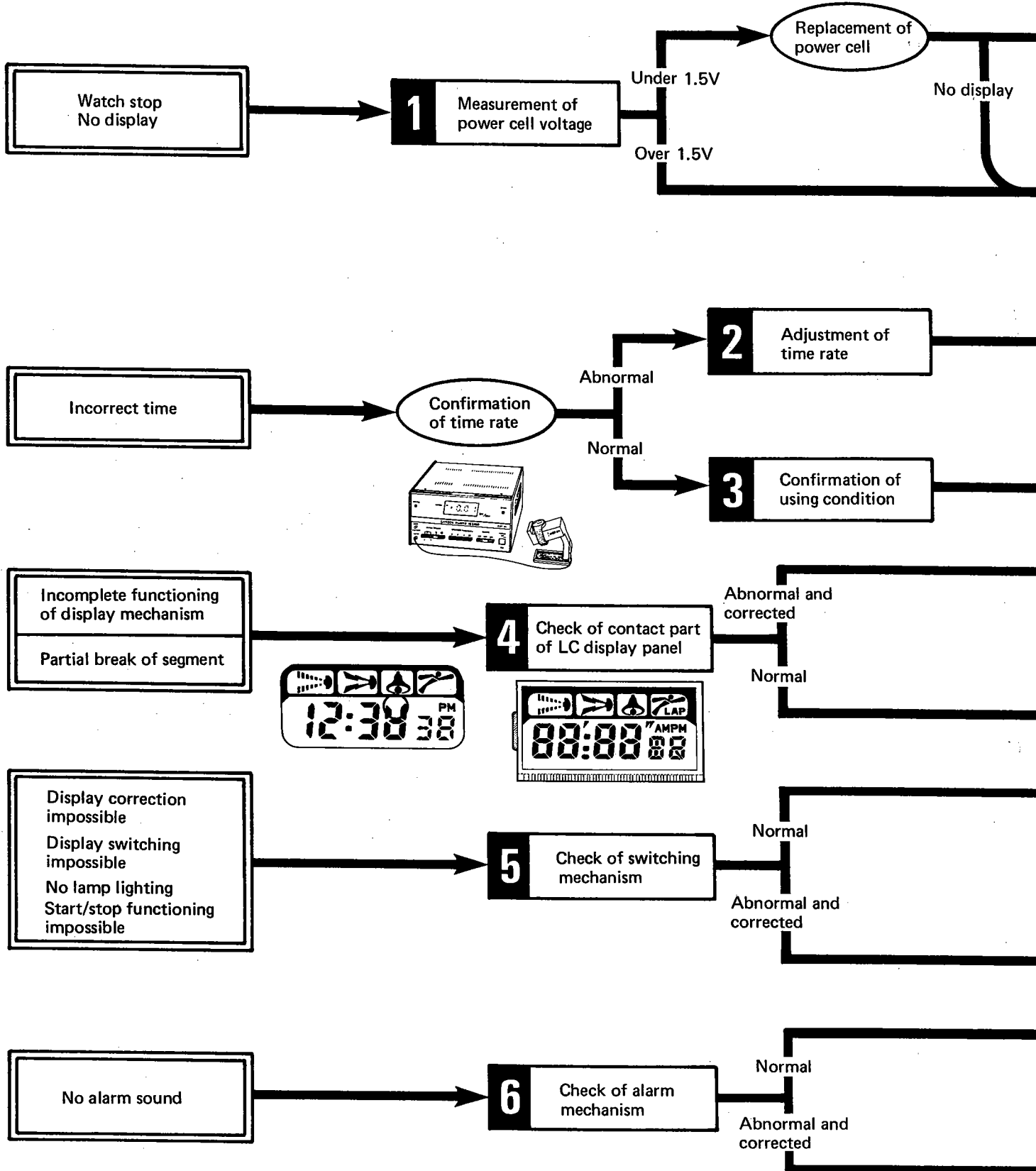
(Cross-section near
hole A of LC display
panel supporter)

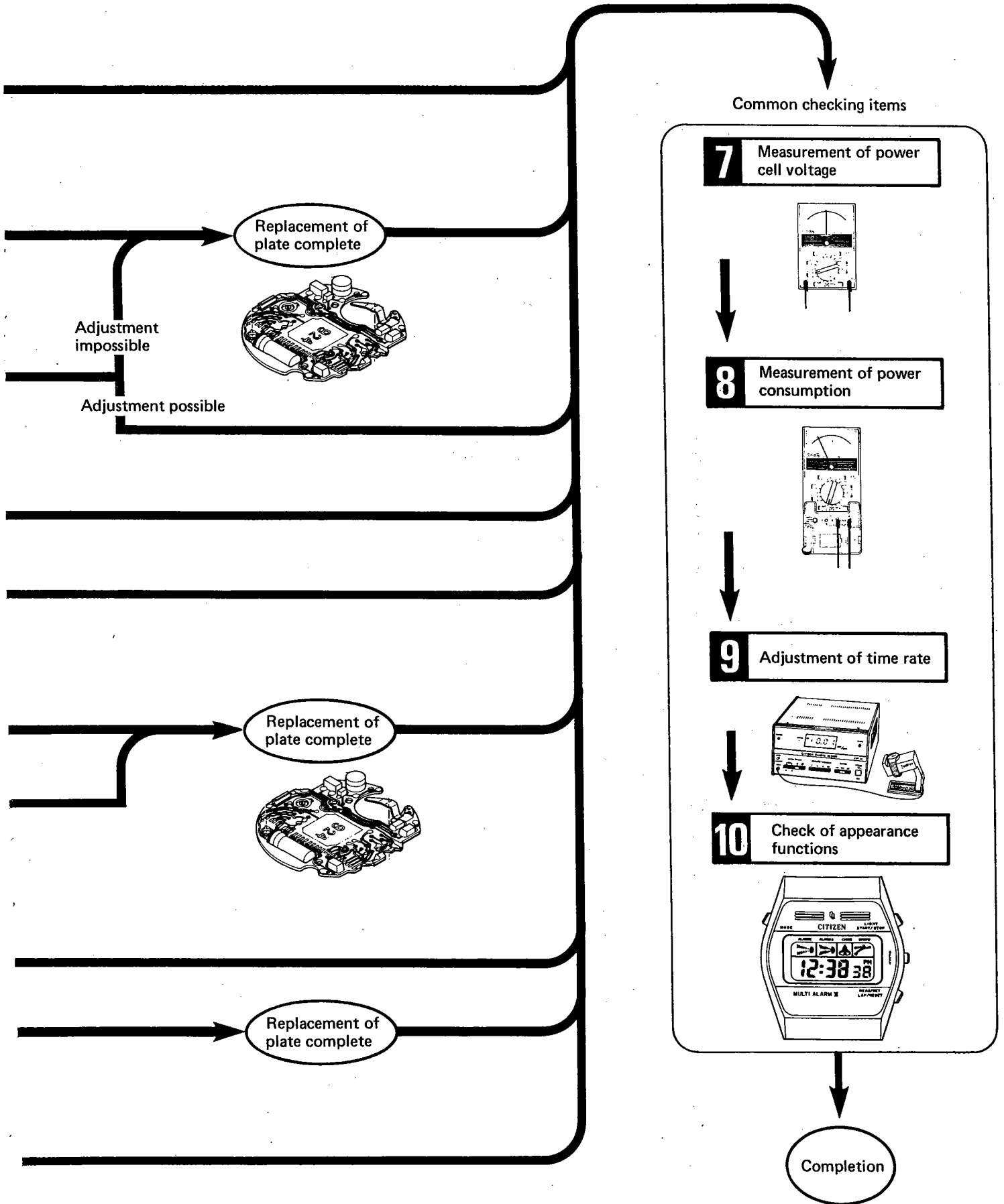
When disassembling and assembling the movement, the area corresponding to the above diagram must be observed through the back side of the LC display panel supporter.

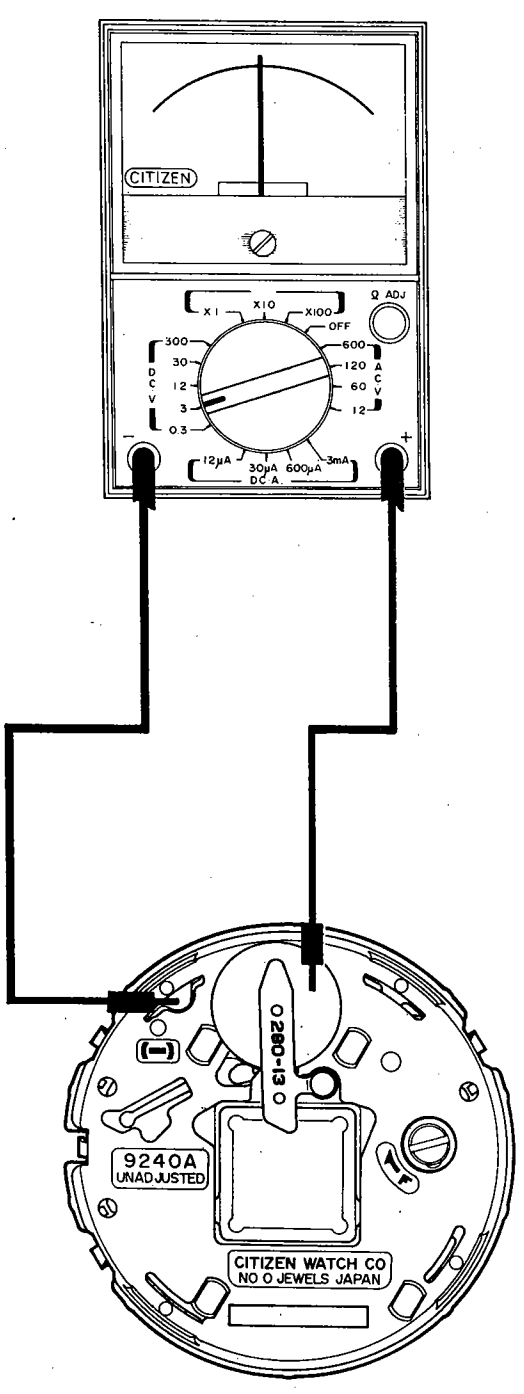
Be careful of malformation of the spring when it is attached or detached.

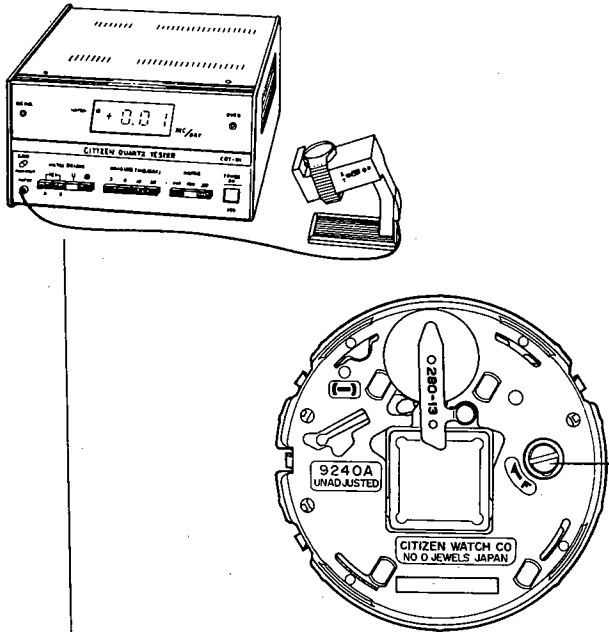
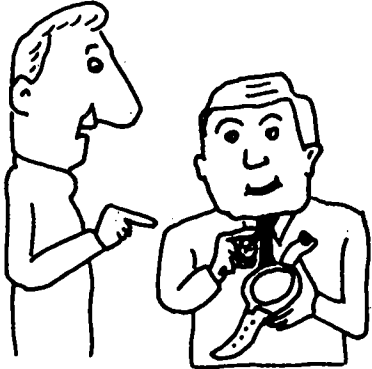
1. The movement is set with the LC display panel side up right after the LC display panel holder is set in.
2. The hooking part of the buzzer contact spring is turned down, and the spring is held by a tweezers as illustrated left.
3. Then the spring is put close to the hole of arrow A. Notice that the two holes of arrow A exist on the movement.
4. The spring hooking part is fitted to the notch of the hole and then pushed in.
5. The spring is turned 180° more or less after being pushed into the hole completely. The spring (I) is turned counterclockwise and spring (II) clockwise respectively.
6. The spring is fixed at the arrow-marked part (←→) shown in the left figure. In this case, the spring is lifted up slightly to check whether or not it turns in the opposite direction to that of the inserting time. If the spring does not turn reversely, the attachment of the spring is good.
7. The spring can be detached by pressing lightly and turning (about 60°) it, and then lifting it with a reverse turn to the attachment time.

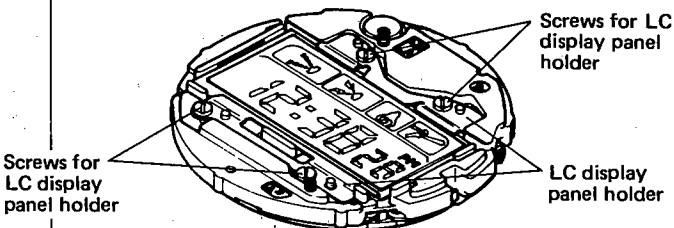
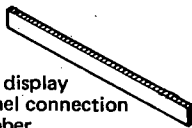
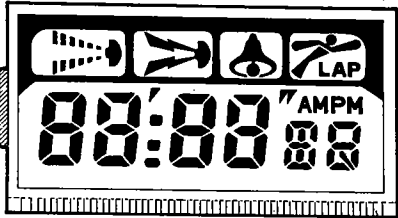
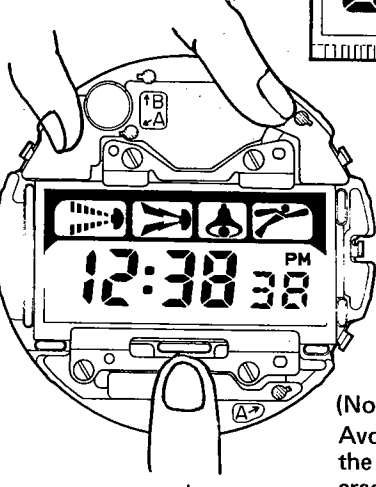
§6. TROUBLESHOOTING AND ADJUSTMENT

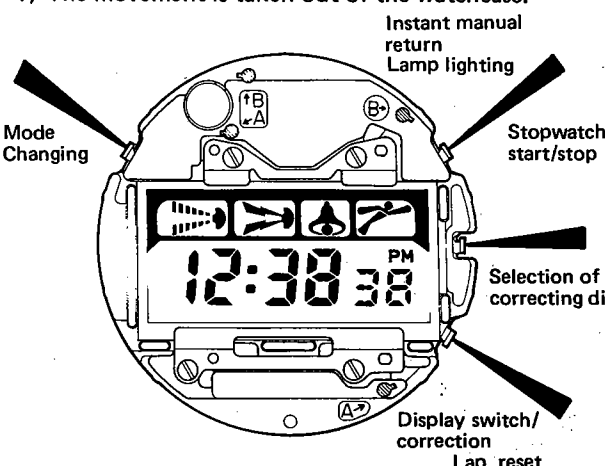
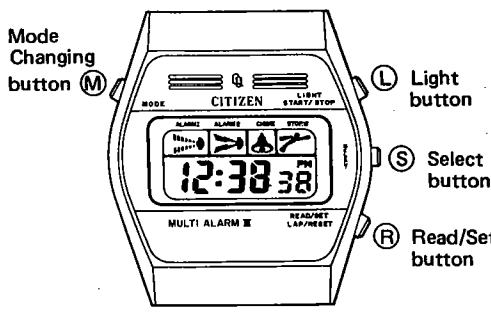


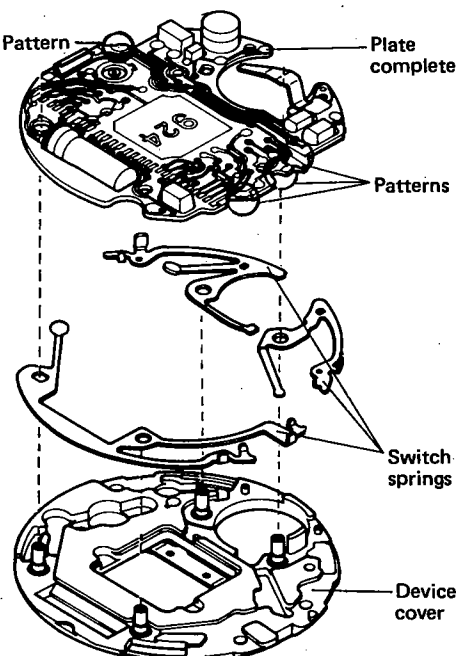
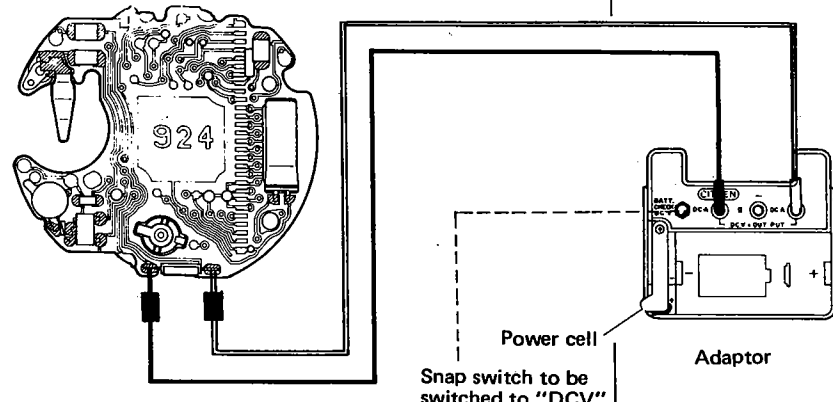


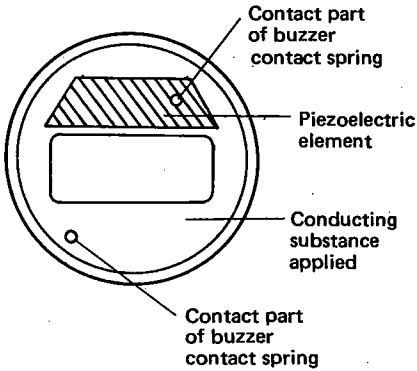
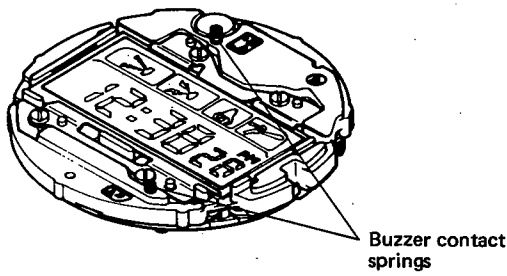
Checking items	How to check	Results & treatment
<p>1 Measurement of power cell voltage (Watch stop) (No display)</p>	<p>How to check</p>  <p>*In case the readings is unsteady or OV with the power cell put into the watch and the readings is more than 1.5V with the power cell itself, the contact may sometimes be incomplete between the power cell connector and the minus (-) pole of the cell. Thus, an inspection must be given to the dust or stains sticking onto the contact surface.</p>	<p>Over 1.5V</p> <ul style="list-style-type: none"> • No display of LC display panel → Replacement of plate complete <p>Under 1.5V</p> <p>After replacement of power cell:</p> <ul style="list-style-type: none"> • Display of LC display panel → 8 Measurement of power consumption • No display of LC display panel → Replacement of plate complete <div style="border: 1px solid black; padding: 5px; margin-top: 20px;"> <p>If the watch has been used more than two years, the power cell must be replaced with new one although the old power cell shows more than 1.5V output.</p> </div>

Checking items	How to check	Results & treatment
<p>2 Adjustment of time rate (Abnormal time rate)</p>	<p>• In case the time rate has a big error, the time rate is adjusted by turning the trimmer condenser after measurement through the timing machine.</p>  <p>The diagram shows a timing machine on the left and the back of a watch case on the right. The watch back is open, revealing internal components. A label '9240A UNADJUSTED' is visible near the quartz crystal oscillator. A trimmer condenser is located near the oscillator, with an arrow pointing to it and the label 'Trimmer condenser'. Below the watch back, a note states: 'The clockwise turning (in arrow indicating direction) gains the time.'</p> <p>*When the time rate adjustment is impossible via the trimmer condenser and the time rate has no change at all, the quartz crystal oscillator and the trimmer condenser may be defective respectively.</p>	<p>• Adjustment possible → Common checking items</p> <p>• Adjustment impossible → Replacement of plate complete</p>
<p>3 Confirmation of using condition (Normal time rate)</p>	<p>The following points are confirmed to the user of the watch.</p>  <p>The illustration shows a technician on the right holding a watch and a customer on the left pointing towards it.</p> <ol style="list-style-type: none"> 1) Whether or not the watch was used in a wrong way. 2) Whether or not the watch was used in an extreme temperature, i.e., outside the effective temperature range. 3) How many days have passed since the time is set last? 4) And others. 	

Checking items	How to check	Results & treatment
<p>4 Check of contact part of LC display panel</p> <ul style="list-style-type: none"> • Incomplete functioning of display mechanism • Partial break of segment 	<p>• In case the partial break of segment occurs, the contact may be unsteady between the LC display panel and the electronic circuit or the LC display panel and the electronic circuit may have some fault. And the former defect occurs more than the latter. Thus, the checking is given to the contact part of the LC display panel as follows.</p> <p>1) Check of LC display panel holder</p> <ol style="list-style-type: none"> (1) Whether or not the screw is broken or loose for the LC display panel. (2) Whether or not the LC display panel holder is holding the LC display panel evenly or the panel holder has some deformation.  <p>2) Check of LC display panel connection rubber</p> <ol style="list-style-type: none"> (1) Whether or not the rubber is twisted, worn out or stretched extremely. (2) Whether or not the rubber has any dust or stains stuck.  <p>3) Check whether or not the electrode part of the LC display panel has any dust or stains stuck as well as any crack. The thorough inspection must be given to the electrode part of the partial break of segment.</p>   <p>* As illustrated left, the area near the broken segment is pressed light with a finger. And if the segment glows, the unsteady contact is decided as the cause of the fault.</p> <p>(Note) Avoid applying a strong force to press the LC display panel in order to prevent crack of the glass.</p>	<ul style="list-style-type: none"> • Screw broken → Replacement • Screw loosened → Retightening • Uneven holding of display panel → Reassembly • Deformation panel holder → Replacement • Rubber twisted, worn out or stretched → Replacement • Dust or stains sticking → Clearing • Dust or stains sticking → Clearing • Electrode part cracked → Replacement of LC display panel No fault detected through above checking → Replacement of LC display panel Correction impossible yet → Replacement of plate complete

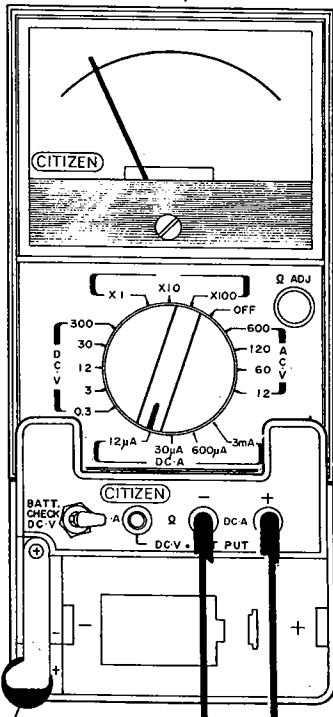
Checking items	How to check	Results & treatment
<p>5 Check of switch mechanism (Defective additional devices, display switch/correction impossible)</p>	<p>1) The movement is taken out of the watchcase.</p>  <ul style="list-style-type: none"> • As illustrated above, each switch part is pressed with a tweezers or the like to check the correct operation of each function. <p>2) Check of push-buttons Each push-button is taken out of the watchcase to give the following check.</p> <ol style="list-style-type: none"> (1) Whether or not each push-button has a smooth operation. (2) Whether or not any dust or stains stick to each push-button as well as to the area of the case where the push-button is to be set in. (3) Whether or not each push-button has some bend or deformation. (The silicon oil is applied to the packing of each push-button.) 	<ul style="list-style-type: none"> • Normal operation → 2) check of push-buttons • Abnormal operation → 3) Check of switch springs • No lamp lighting → 4) Check of lamp • Dust or stains sticking → Clearing • Push-button bent or deformed → Replacement

Checking items	How to check	Results & treatment
	<p>3) Check of switch springs</p> <p>(1) Whether or not each switch spring has some deformation or breakage.</p> <p>(2) After each switch spring and the plate complete are set into the device cover, the center part of the plate complete is pressed lightly by the finger with the fingerstall. At the same time, each switch spring is pressed with a tweezers or the like to check a correct contact between the switch spring and the pattern of the plate complete.</p> 	<ul style="list-style-type: none"> ● Switch spring deformed or broken → Replacement ● No fault detected → Replacement of plate complete
	<p>4) Check of lamp</p> <p>Plate complete</p>  <p>● As illustrated above, the lead terminals of the Citizen Multi-Tester are applied to the both ends of the lamp attached to the plate complete via the adaptor of the tester. Thus, the lighting of the lamp is checked.</p>	<ul style="list-style-type: none"> ● No lamp lighting → Replacement of plate complete

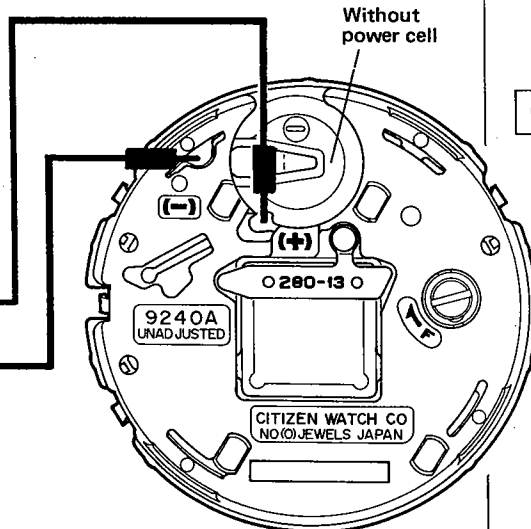
Checking items	How to check	Results & treatment
<p>6 Check of alarm mechanism (No sounding of alarm)</p>	<p>•The alarm sounds through vibrations of the glass of the watchcase by flowing the current to the piezoelectric element adhered inside the glass part.</p> <ol style="list-style-type: none"> 1) Check whether or not the piezoelectric element is adhered firmly to the glass with no crack at all. 2) Check whether or not the buzzer contact spring has no deformation nor wear with a correct contact for good conduction.  	<ul style="list-style-type: none"> •Piezoelectric element cracked → Replacement of glass •Spring deformed or worn out → Replacement of contact spring No fault detected through above checking → Replacement of plate complete

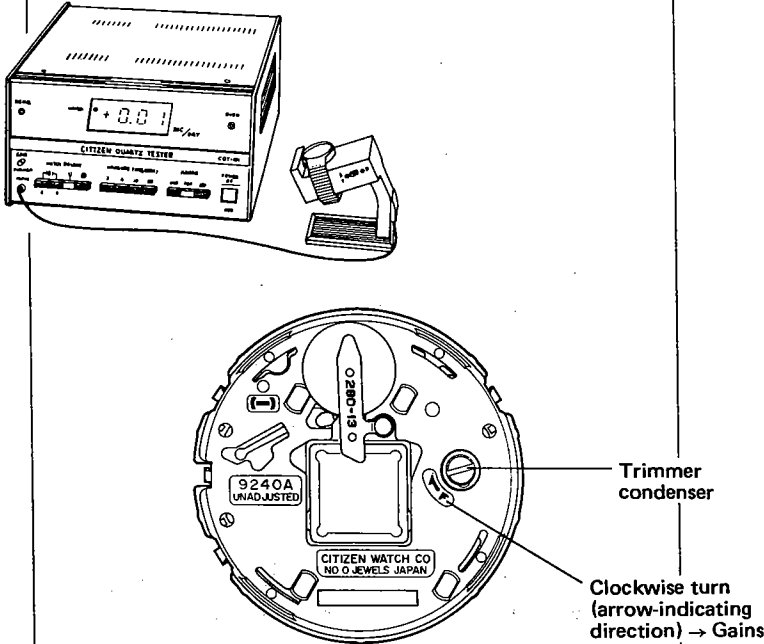

Common Checking Items

Checking items	How to check	Results & treatment
<p>7 Measurement of power cell voltage</p>	<p>Refer to "1 Measurement of power cell voltage".</p>	<p>Over 1.5V</p> <p>→ 8 Measurement of power consumption</p> <p>Under 1.5V</p> <p>After replacement of power cell:</p> <p>→ 8 Measurement of power consumption</p>
<p>8 Measurement of power consumption</p>	<p>*The tester needle may sometimes swings up to the limit when the lead terminals of the Citizen Multi-Tester are applied to the measurement area. Thus, the following procedures are taken for the correct measuring.</p> <ol style="list-style-type: none"> 1 The rotary switch of the tester is set to 3mA. 2 When the needle swings with application of the lead terminals, either one of the four switches correspond to each push-button is pressed. And the rotary switch is set to 12μA or 30μA when the needle swing becomes still at 0μA. Then the value is read out. 	<p>1) Measurement under time display:</p> <p>Under 4.0μA</p> <p>→ 9 Adjustment of time rate</p> <p>Over 4.0μA</p> <p>→ 2) Measurement of power consumption at electronic circuit part</p> <p>2) Measurement of power consumption at electronic circuit part with LC display panel removed</p> <p>Under 3.0μA</p> <p>→ Replacement of LC display pannel connection rubber or LC display panel</p> <p>* Inspection given to dust or the like sticking to contact part</p> <p>Over 3.0μA</p> <p>→ Replacement of plate complete</p>



Power cell



Checking items	How to check	Results & treatment
<p>9 Adjustment of time rate</p>	<p>The time rate is measured through the timing machine, and then the time is adjusted via the trimmer condenser.</p>  <p>The diagram shows a 'CITIZEN QUARTZ TESTER' with a digital display showing '+0.01'. Below it is a disassembled watch case back. A label '9240A UNADJUSTED' is placed near the movement. A 'Trimmer condenser' is indicated with a line pointing to a small component. An arrow indicates a 'Clockwise turn (arrow-indicating direction) → Gains'.</p>	
<p>10 Check of appearance functions</p>	<p>Finally, the checking is given to the appearance functions as follows.</p> <ol style="list-style-type: none"> 1) Whether or not the displayed figures or marks are nondefective. 2) Whether or not each function can be operated correctly. 3) Whether or not each appearance part is completely free from the dust or stains. 4) And others.  <p>The diagram shows the front of a Citizen watch. The display shows '12:38 38'. Four buttons are labeled: 'M' (Mode changing button) on the left, 'L' (Light button) on the top right, 'S' (Select button) on the right, and 'R' (Read/Set button) on the bottom right.</p>	

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