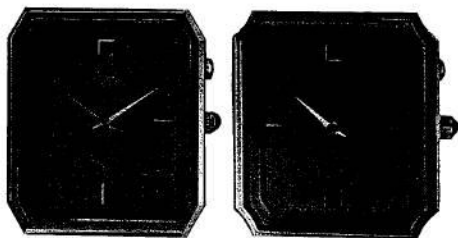


TECHNICAL INFORMATION

CITIZEN QUARTZ

Cal. No. 342※※

Cal. No. 345※※



 **CITIZEN**
CITIZEN IS A REGISTERED TRADEMARK OF CITIZEN WATCH CO., JAPAN.

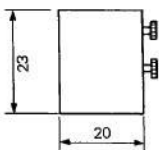
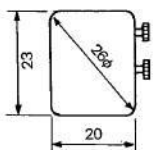
■1. Outline

Cal. 3420A and Cal. 3450A are the middle- and high-grade analog quartz watches which have been recently marketed as the thin-type analog alarm watches.

Cal. 3450A is a two-handed analog alarm watch with date display function.

Cal. 3420A is a two-handed analog alarm watch which was developed from Cal. 3450A by eliminating the date display function and reducing the thickness.

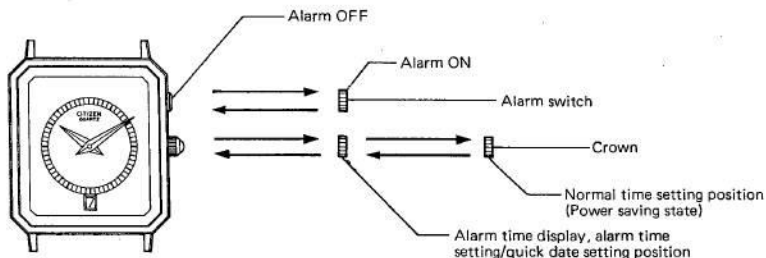
■2. Specifications

Caliber No.		3420A-03	3450A-03
Type		Analog quartz watch (w/o center second)	
Movement (mm)		 <p>Thickness: 2.0t (Power cell part: 2.1t)</p>	 <p>Thickness: 2.5t Power cell part: 2.6t)</p>
Accuracy		±15 sec./month at normal temperatures	
Oscillation		32,768Hz	
Integrated circuit		C/MOS-LSI (1 unit)	
Effective temp. range		-10°C ~ +60°C (14°F ~ 140°F)	
Converter		Bipolar step motor	
Adjustment of time rate		D.F.C. with 2 control terminals for customers' use	
Measurement of time rate		10 seconds	
Additional functions	Date (with quick setting device)	Yes	No
	Electromagnetic setting method	Yes	Yes
	Alarm monitor	Yes	Yes
	Power saving switch	Yes	Yes
	Alarm (melody)	Yes	Yes
Power cell	Parts No.	280-61	
	Cell code	SR916W (Ag ₂ O/KOH)	
	Size	9.5φmm x 1.6 mm	
	Voltage	1.55V	
	Capacity	26mAH	
	Lifetime	About 2 years (Alarm: 20 sec./day)	

* The following technical instructions are written centering around Cal. 3450A* (with date display function), however, the technical instructions except the description given to the date display function will also refer to Cal. 3420* (without date display function).

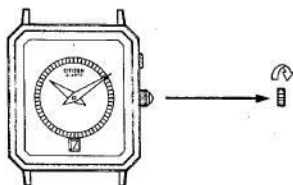
■3. HANDLING INSTRUCTIONS

1) Nomenclature



2) Quick date setting

- Set the alarm switch OFF.
- Pull the crown out to the first clicking position.

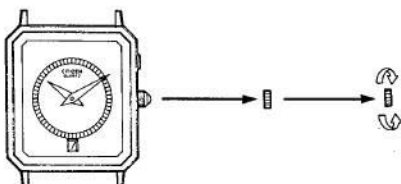


Date can quickly be set by turning the crown clockwise.

* A counterclockwise turn of the crown causes idle running.

3) Normal time setting

- Setting is possible with either state of the alarm switch, ON and OFF.
- Pull the crown out to the second clicking position.



* Time setting is possible on a 20-second basis.

- If the crown is turned clockwise, the hands will move counterclockwise.
- If the crown is turned counterclockwise, the hands will move clockwise.

- A quick turn of the crown enables quick setting of time. If you want to stop the quick setting, turn the crown slowly.
- Time can be set on a 20-second basis with a slow turn of the crown.
- Time setting should be made after setting the minute hand to the exact minute mark (integral number). The hands start running immediately after the crown is pushed back to its normal position. If time setting is made without setting the minute hand to the exact minute mark (integral number), alarm will sound 20 seconds before or after the alarm set time.

4) Switching between the normal time and alarm time displays

Both normal and alarm time are indicated by the same hour and minute hands.

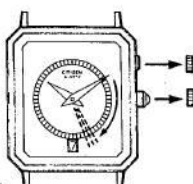
[The crown is in its normal position.]

- Set the alarm switch ON.
- Pull the crown out to the first clicking position.

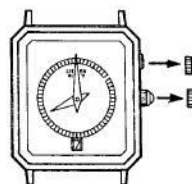
- Set the alarm switch ON.
- Pull the crown out to the first clicking position.



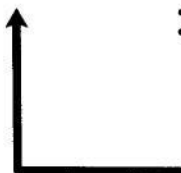
(Normal time display)



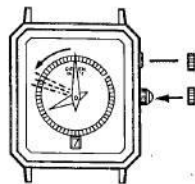
(Starting the quick turn of the hands)



(Alarm time display)



- Set the alarm switch ON or OFF.
- Push back the crown to its normal position.



(Quick return)



(Starting the quick turn of the hands)

The quick turn of hands is initiated by shifting the alarm switch from OFF to ON and pulling the crown out of its normal position to the first clicking position. — When this is done, the hands move clockwise.

(Alarm time display)

After completing the quick turn, the hands will become still. The time indicated by the unmoving hands is alarm time. At this moment, a confirmation sound is heard.

(Quick return)

To replace alarm time display with normal time display, the crown should be pulled back to its normal position. (In this case, it does not matter whether the alarm switch is set ON or OFF.) — The hands move counterclockwise. When the hands stop, the normal time display is shown.

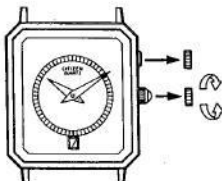
At this moment, a confirmation sound is heard.

* Alarm time display will be replaced by normal time display (quick date setting mode), also when the alarm is switched from ON to OFF with the crown remaining pulled out to the first clicking position.

A confirmation sound is also heard at that time.

5) Alarm time setting

- Set the alarm switch ON.
- Pull the crown out to the first clicking position.



- * Time setting is available on a one-minute basis.
- If the crown is turned clockwise, the hands move counterclockwise.
- If the crown is turned counterclockwise, the hands move clockwise.

- Quick setting is possible with a quick turn of the crown. If you want to stop the quick setting, turn the crown slowly.
- Setting can be achieved on a one-minute basis by turning the crown slowly.
- With the alarm switch remaining ON, the alarm sounds twice a day (one alarm in the morning and the other in the afternoon). (It sounds for 20 seconds each time.)

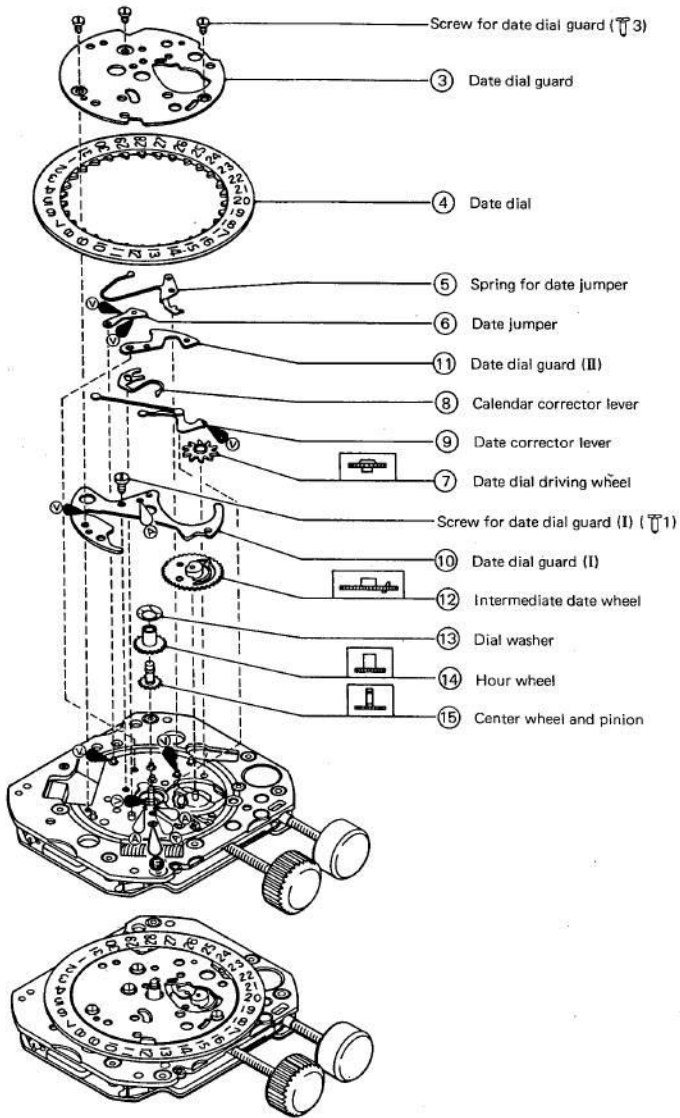
(Note) Date changes sometime between 12:00 AM and 3:30 AM. Please be careful not to confirm the alarm set time or set alarm time during that period, or the date won't change.

6) ON and OFF of alarm

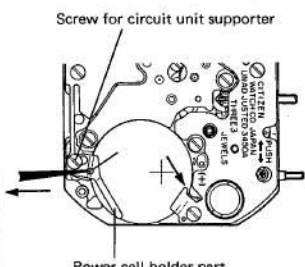
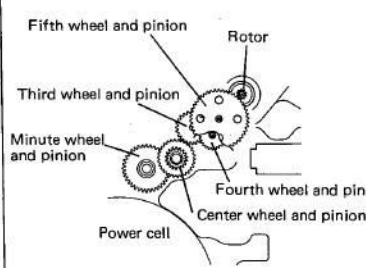
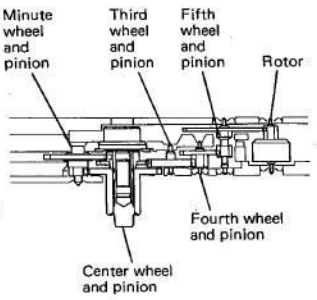
Pulling out the alarm switch turns alarm ON. Pushing it in turns alarm OFF.
To stop the alarm from sounding, push the alarm switch in.

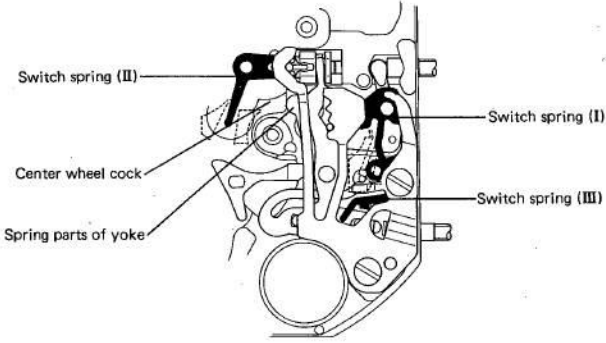
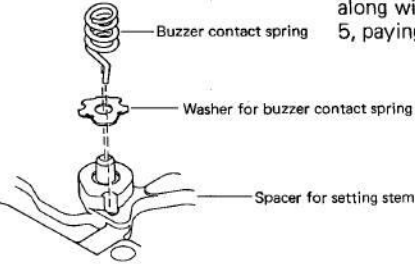
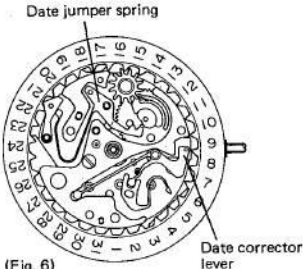
7) Alarm monitor

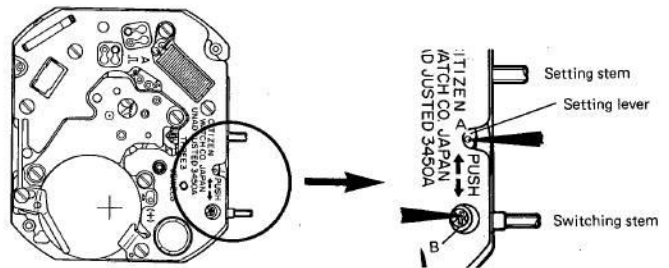
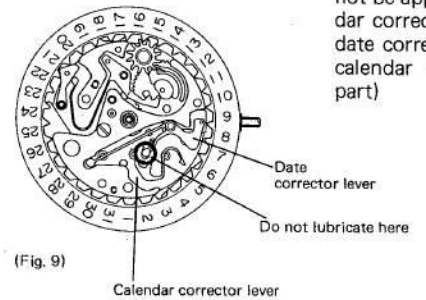
If the alarm is switched in the order of ON → OFF → ON within a second, a melody will sound for 20 seconds as the alarm monitor.



■5. NOTES ON DISASSEMBLY & ASSEMBLY

Items	Contents
<p>1. How to replace power cell</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p style="text-align: center;">(Fig. 1 Plane Figure of Power Cell)</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> ● Removal of the power cell If the screw for circuit unit supporter is loosened, the power cell holder part comes off and moves in the direction of the arrow automatically. Then, remove the power cell. ● Mounting of the power cell With the power cell holder off, insert the power cell under part A. After making sure that the power cell is properly placed, fasten the screw for circuit unit supporter with the power cell holder remaining weighed down. </div> </div>
<p>2. Assembling of train wheel</p>	<p>The train wheels should be assembled with care in accordance with Fig. 2 and 3.</p> <p>The minute wheel and pinion is made of plastic. Be careful not to damage the pinion.</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;">  <p style="text-align: center;">(Fig. 2 Plane Figure of Train Wheels)</p> </div> <div style="width: 45%;">  <p style="text-align: center;">(Fig. 3 Cross Section of Train Wheels)</p> </div> </div>

Items	Contents
<p>3. Assembling of dial side mechanism</p>	<p>The parts comprising the dial side should be assembled in accordance with the following:</p> <ul style="list-style-type: none"> ● When assembling the yoke, be careful that the yoke spring does not rest on the center wheel cock. (Assemble the yoke so that the spring may contact with the center wheel cock at its side surface.) ● Switch springs (I), (II) and (III) should be handled carefully to avoid damage. ● The parts comprising the dial side should be assembled properly so that they may not come up.  <p>(Fig. 4)</p>
<p>4. Assembling of washer for buzzer contact spring and buzzer contact spring</p>	<p>Assemble the buzzer contact spring along with its washer as shown in Fig. 5, paying attention to their direction.</p>  <p>(Fig. 5)</p>
<p>5. Assembling of calendar side mechanism</p>	 <p>(Fig. 6)</p> <ul style="list-style-type: none"> ● The date jumper spring and the date corrector lever should be assembled properly as shown in Fig. 6. ● Make sure that the pinion part of the center wheel and pinion and the minute wheel and pinion, or the center wheel and pinion and the third wheel and pinion, engage each other in a desired way.

Items	Contents
<p>6. How to insert or remove setting stem and switching stem</p>	<ul style="list-style-type: none"> ● Inserting or removing the setting stem With the crown remaining in its normal position, push the part (A) of the setting lever marked with the arrow outwards using the tweezers, and the setting stem is removed. ● Inserting or removing the switching stem With the switching stem remaining pulled out to the first clicking position (alarm is set ON), push part (B) marked with the arrow outwards using the tweezers, and the switching stem is removed.  <p>(Fig. 7)</p>
<p>7. Note on lubrication</p>	<p>As shown in Fig. 9, lubrication should not be applied to the axis of the calendar corrector lever and also where the date corrector lever contacts with the calendar corrector lever. (Encircled part)</p>  <p>(Fig. 9)</p>
<p>8. Note on installation of hands</p>	<ul style="list-style-type: none"> * Install the hands and set them to 3:00 just after date changes. If the hands have been installed properly, the date dial will continue to move between 1:00 AM and 3:00 AM. It should be noted that if the alarm setting is carried out between 1:00 AM and 3:30 AM, the date won't change. In case the hands have been installed and set to 12:00 just after the date changes, the date won't change if the alarm is set between 10:00 PM and 12:00 PM. (To call customers' attention to the above, an illustration with some English words is attached on the case back of the watch.)

■6. CONCERNING THE SWITCH MECHANISM

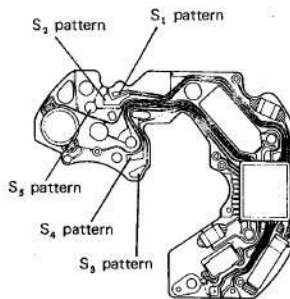
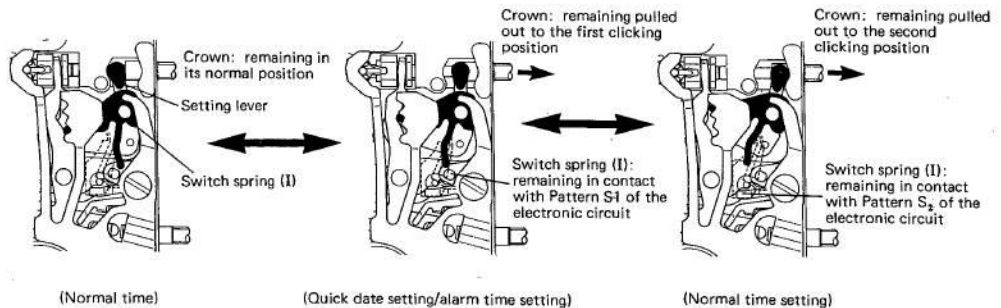
This caliber employs the electromagnetic setting method, which enables time setting and selects the turning direction of the hands when time is set, by the switching function of the crown.

Switching of the alarm between ON and OFF is done by operating the alarm switch button.

Better understanding of the switch mechanism may be very helpful in troubleshooting, checking and adjusting.

1) Switching of the functions (normal time ↔ quick date setting/alm time setting ↔ normal time setting)

The pointed end of the switch spring (I) moves as illustrated below by operating the crown, and comes into contact with Pattern S1 or S2, both of which are located on the back side of the electronic circuit, depending on the movement. The functions vary in accordance with the state of the contact. (See Table 1 on Page 16).



(Back side of Electronic circuit)

Crown	Switch Spring (I)	Functions
Normal position	No contact with the pattern	● Normal time
First clicking position	Contact with Pattern S ₁	● Quick date setting
		● Alarm time setting
Second clicking position	Contact with Pattern S ₂	● Normal time setting

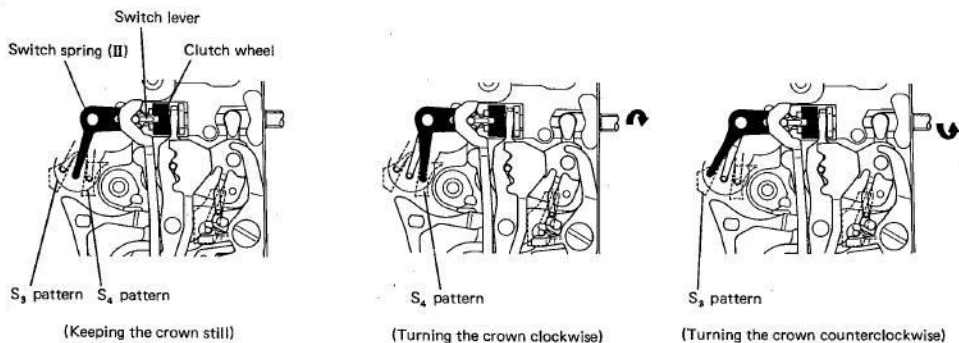
(Table 1)

2) Time setting (Normal time/Alarm time)

If the crown is turned either clockwise or counterclockwise when normal time or alarm time is set, the clutch wheel rotates and then the pointed end of the switch spring (II) swings either right or left with the aid of the switch lever that is in contact with the clutch wheel.

The pointed end of the switch spring contacts with either Pattern S3 or S4 on the back side of the electronic circuit depending on the swinging direction of the pointed end.

The hands go around either clockwise or counterclockwise in accordance with the state of the contact.



The following settings are available depending on how the switch spring (II) contacts with Pattern S₃ or S₄.

(a) continuous setting (64 Hz)

(b) occasional (every pulse) setting Normal time is set on a 20-second basis, and alarm time is set on a one-minute basis.

(a) is useful to rough setting and (b) is to fine setting.

(a) and (b) are easily achieved only by changing the turning speed of the crown.

- Turning the crown quickly continuous setting
- Turning the crown slowly occasional setting

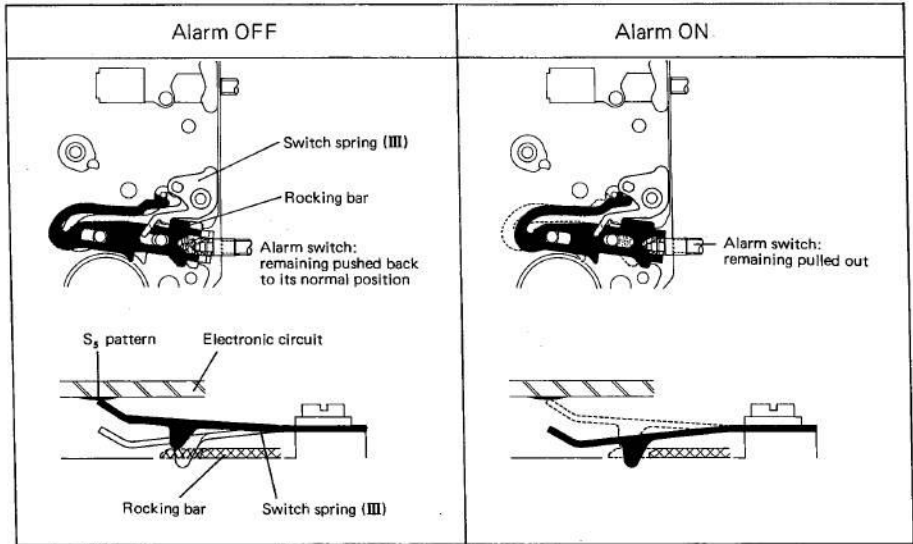
No matter how the crown is turned, clockwise or counterclockwise, either setting is possible.

Continuous quick forwarding of the hands (64 Hz) will stop if the crown is turned slowly.

3) ON and OFF of the alarm switch

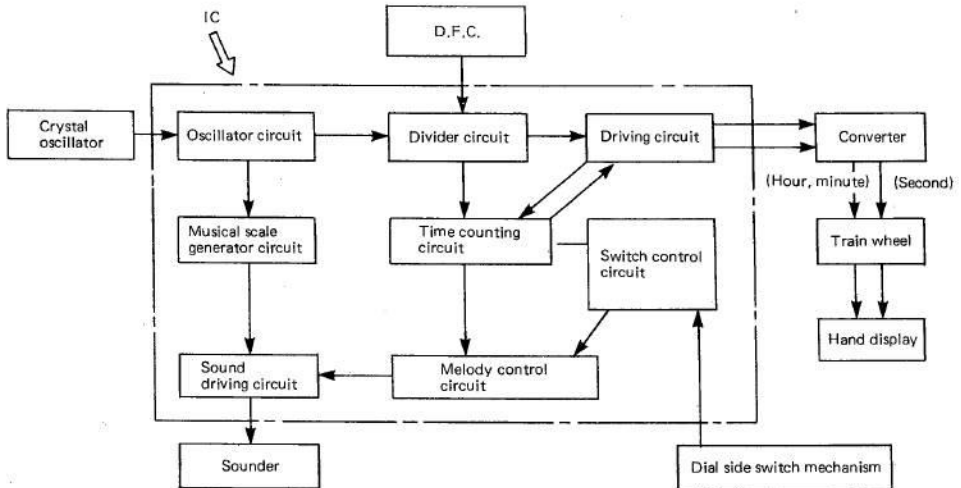
Alarm is set by pulling the alarm switch out of or pushing it into its normal position.

If the alarm switch is operated, the pointed end of the switch spring (III) moves up and down with the aid of the rocking bar. When the pointed end of the switch spring goes up, it contacts with Pattern S_2 which is situated on the back side of the electronic circuit, thus turning alarm OFF.



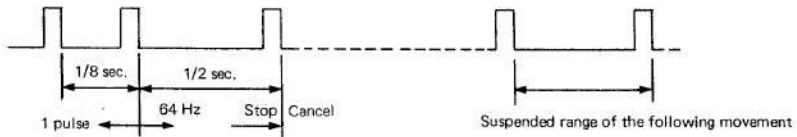
★ Reference

1) Circuit configuration of Cal. 3450

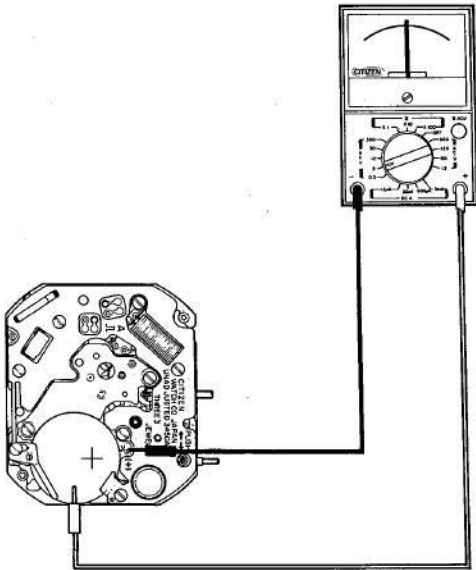
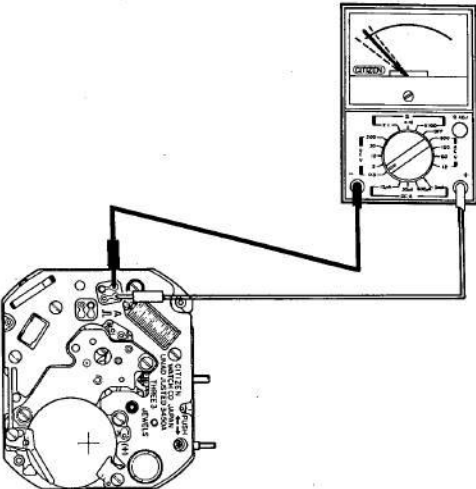


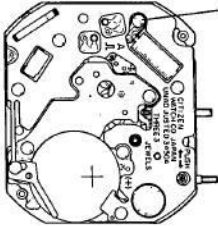
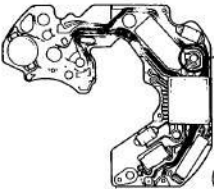
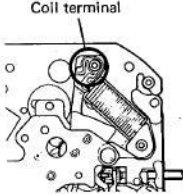
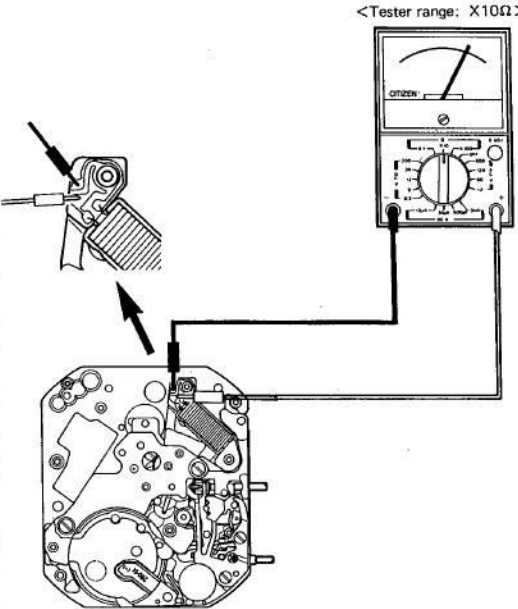
2) Concerning the specifications of the switch

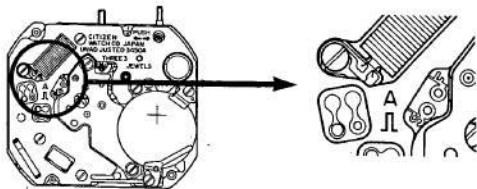
- Pulling the crown out to its first clicking position
..... There will be a shift from one function to another a 1/2 of a second after being pulled.
- Pulling the crown out to its second clicking position
..... There will be an immediate shift from one function to another.
- Turning the crown either clockwise or counterclockwise to correct time
..... One pulse of correction is achieved with one possible movement of the switching mechanism (one shot) generated by the turn of the crown.
 - a. A quick turn of the hands (64 Hz) is generated with 2 shots within a 1/8 of a second.
 - b. During the quick turn of the hands, if the signal is transmitted at the interval of more than a 1/2 of a second, the hands receive the signal and stop. However, the signal is canceled if transmitted at the interval of less than a 1/2 of a second.
 - c. The signal transmitted at the interval of more than a 1/8 of a second enables one pulse of correction.

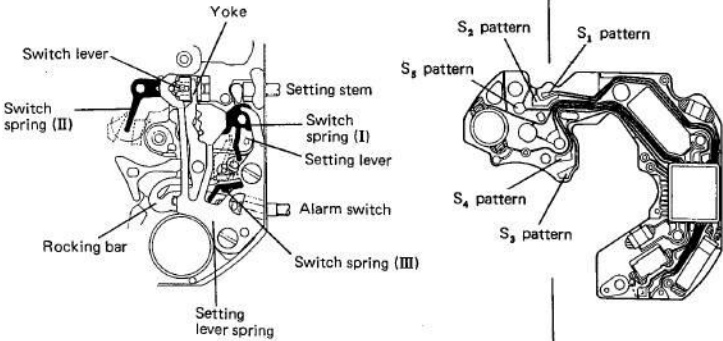


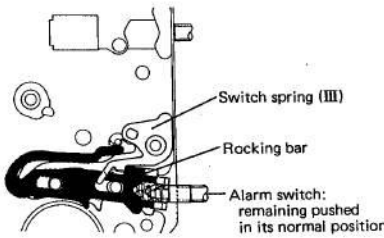
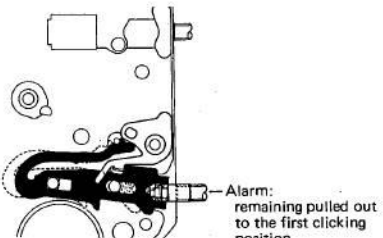
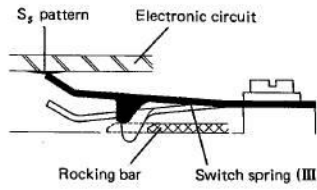
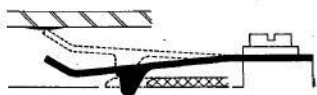
- d. One pulse of correction of normal time is made on a 20-second basis, and that of alarm time is made on a one-minute basis.

Checking items	How to check	Result and treatment
<p>1 Measurement of power cell voltage</p>	<p><Tester range: D.C. 3V></p> 	<p>Over 1.5V → Nondefective</p> <p>Under 1.5V → Replacement of power cell</p> <p>If the screw for electronic circuit is loose, the circuit may sometimes not be loaded with sufficient voltage.</p>
<p>2 Check of output signal</p>	<p>1) This watch employs the 20-second step movement of hands. If the tester lead pin is put to the movement as shown below, the tester pointer swings back and forth every 20-seconds. (It does not matter which polarity the test lead pin has.) Make sure that the crown is in its normal position.</p> <p><Tester range: D.C. 0.3V></p> 	<p>The tester pointer swings every 20 seconds → Nondefective</p> <p>The tester pointer does not swing at all → Replacement of unit of electronic circuit</p>

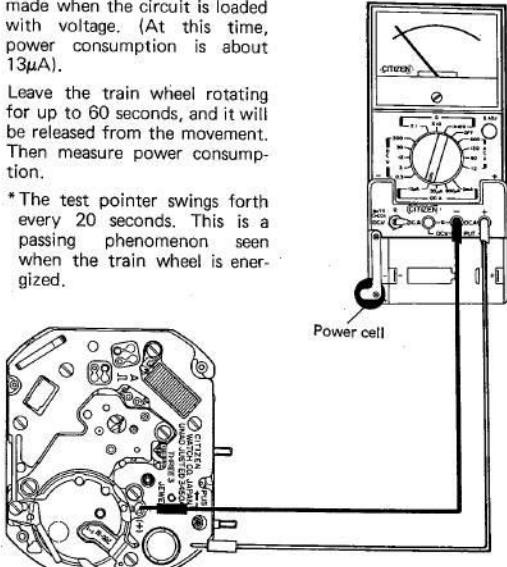
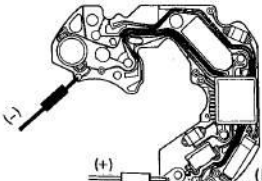
Checking items	How to check	Result and treatment
<p>3 Check of connection parts</p>	<p>When the screw for electronic circuit is loose, the driving signal may sometimes not be transmitted.</p>  <p>Screw for electronic circuit</p> <p>If the coil terminal or the output pattern of the electronic circuit's driving signal becomes dirty, there will occur a bad transmission of signal.</p>  <p>Output pattern of driving signal (Back side of Electronic circuit)</p>	<p>If the screw has become loosened → Tighten it</p> <p>Dirt → Removal</p>  <p>Coil terminal</p>
<p>4 Measurement of coil resistance</p>	<p>Measure the coil for resistance as shown below. The tester lead pin has no polarity. Measurement should be made after the electronic circuit is removed from the watch.</p>  <p><Tester range: X10Ω></p>	<p>Coil resistance is between 0.8 KΩ and 1.3 KΩ → Nondefective</p> <p>Coil resistance is beyond the above range → Replacement of coil unit</p>


Checking items	How to check	Result and treatment
<p>5 Check of train wheels</p>	<ul style="list-style-type: none"> ● Make sure that the transmission goes smoothly with each gear with an appropriate clearance and with no backlash. ● Make sure that no dust or foreign matter gets in the gears. It is especially necessary to confirm that no cuttings adhere to the rotor part. ● Make sure that the gears are lubricated observing the following: <ul style="list-style-type: none"> if they are fully lubricated with no shortage of oil; if they are oil-stained; if oil drifts away over them; if they are excessively lubricated. ● Make sure that each hole jewel has no crack or slant. 	<ul style="list-style-type: none"> ● Backlash → Replacement of gear ● Improper clearance → Adjustment of clearance ● Dust or foreign matter → Removal ● Dirt → Cleaning
<p>6 Check of indicating mechanism and calendar side mechanism</p>	<p>1) Check of the indicating mechanism</p> <ul style="list-style-type: none"> ● Confirm that the hour wheel properly engages with the minute wheel and pinion. When installing the hour wheel, pay special attention to the pinion part of the minute wheel and pinion to avoid damage. ● Confirm that the intermediate date wheel properly engages with the hour wheel. <p>2) Check of the calendar side mechanism</p> <ul style="list-style-type: none"> ● Make sure that there is no deformation (warp or backlash) with the date jumper, date dial and date dial guard. 	<ul style="list-style-type: none"> ● The minute wheel and pinion is made of plastic. Damage of the pinion part of the minute wheel and pinion may lead to the rundown of the watch. ● Any deformation is found → Replacement of deformed part
<p>7 Measurement and adjustment of time rate</p>	<p>a Measurement of time rate This watch employs the D.F.C. for measurement. Accordingly, at the time of measurement, set the measurement range at 10 seconds or its integral multiple.</p> <p>b Adjustment of time rate If the watch does not run correctly, make an adjustment of time rate by cutting Pattern S or F of adjustment terminal.</p> 	<p>Cut the pattern with a knife or the like</p> <ul style="list-style-type: none"> ● If only Pattern F is cut → About +15 sec./month ● If only Pattern S is cut → About -15 sec./month ● If both Patterns S and F are cut → About -30 sec./month ● The watch still gains or loses substantially even after the pattern is cut → Replacement of unit of electronic circuit

Checking items	How to check	Result and treatment
<p>8 Check of switch mechanism</p>	 <p>1. The switching of the functions is not possible.</p> <p>If the smooth switching is not obtained between normal time and quick date setting, or between alarm time setting and normal time setting, check the following respective points:</p> <ol style="list-style-type: none"> 1) that the switch spring (I) is not deformed; 2) that there is no dust or dirt where the switch spring (I) contacts with patterns S₁ and S₂ which are on the back side of the electronic circuit; 3) that the yoke, setting lever and switch spring (I) are all assembled properly; 4) that oil is fully supplied to the setting stem, yoke and setting lever. <p>2. Time setting is not possible.</p> <p>When it is impossible to set normal time or alarm time, check the following items:</p> <ol style="list-style-type: none"> 1) that the switch spring (II) is not deformed; 2) that there is no dust or dirt where the switch spring (II) contacts with patterns S₃ and S₄ which are on the back side of the electronic circuit; 3) that the switch lever and switch spring (II) are assembled properly; 4) that the contact part of the clutch wheel with the switch lever is fully lubricated. 	<p>Any part is deformed → Bend it back to its normal shape or replace it</p> <p>Dust or dirt → Removal</p> <p>Improper assembly of parts → Proper assembly</p> <p>Insufficient lubrication → Addition of lubricant</p> <p>Malfunction of the switch mechanism still continues even after making sure 1) ~ 4) left. → Replacement of unit of electronic circuit</p>

Checking items	How to check	Result and treatment
	<p>3. If the alarm switch can not be set either ON or OFF, check the following items;</p> <ol style="list-style-type: none"> 1) that the switch spring (III) is not deformed; 2) that there is no dust or dirt where the switch spring (III) contacts with pattern S_5 which is placed on the back side of the electronic circuit; 3) that the switch spring (III) and the rocking bar are properly assembled; 4) that the switch spring (III) and the rocking bar are fully lubricated. <p>*Special attention should be paid to whether the switch spring is not deformed and whether the parts are properly assembled.</p>	<p>Any part is deformed → Bend it back to its normal shape or replace it</p> <p>Dust or dirt → Removal</p> <p>Improper assembly of parts → Proper assembly</p> <p>Insufficient lubrication → Addition of lubricant</p>
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(Alarm: OFF)</p>  </div> <div style="text-align: center;"> <p>(Alarm: ON)</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	

Checking items	How to check	Result and treatment
<p>9 Check of alarm mechanism</p>	<p>1. Confirmation of the output of the alarm</p> <p>Measure the alarm's output using the alarm monitor as illustrated below.</p> <p>* Alarm monitor If the alarm is swiftly switched in the order of ON → OFF → ON within a second when normal time is displayed, the alarm monitoring condition is generated and subsequently a melody is heard for 20 seconds.</p> <div data-bbox="379 439 872 901" style="text-align: center;"> <p><Tester range: D.C. 12V></p> </div> <p>2. Confirmation of parts installation</p> <ul style="list-style-type: none"> • Confirm that the buzzer contact spring and its spacer are installed in a proper way. (Refer to the diagram below.) • Confirm that the piezo-electric element (white), which is directly adhered against inside surface of the back cover, is not cracked or chipped off. <p>3. Confirmation of the alarm switch side</p> <p>The above confirmation should be made referring to Checking item No. 8 Section 3) If the alarm switch cannot be set at either ON or OFF (page 18).</p> <div data-bbox="481 1223 866 1489" style="text-align: center;"> <p>— Buzzer contact spring</p> <p>— Spacer for buzzer contact spring</p> <p>— Spacer for setting stem</p> </div>	<p>The tester pointer swings back and forth → Nondefective</p> <p>The tester pointer does not swing at all → Replacement of unit of electronic circuit</p>

Checking items	How to check	Result and treatment
<p>10 Measurement of power consumption</p>	<p>Measurement of power consumption should be made with the electric circuit because this caliber employs the 20-second step movement of hands.</p> <p>The measurement is available in two ways, as mentioned below. Adopt either one according to the situation.</p> <p>1. Measurement of the movement (For instance, measured when the power cell is replaced)</p> <p>When the test lead pin is put to the movement as illustrated below, the train wheel may sometimes turn around. This is because quick setting of time is made when the circuit is loaded with voltage. (At this time, power consumption is about $13\mu\text{A}$).</p> <p>Leave the train wheel rotating for up to 60 seconds, and it will be released from the movement. Then measure power consumption.</p> <p>* The test pointer swings forth every 20 seconds. This is a passing phenomenon seen when the train wheel is energized.</p>  <p>2. Measurement of the electronic circuit (For instance, measured when the watch is overhauled.)</p> <p>Apply the tester to the electronic circuit in the same way as illustrated above.</p>  <p>* Measurement on the front side of the electronic circuit is also available. However, this is not recommended because the electronic circuit is very thin. To avoid the electronic circuit from being deformed or damaged, measurement should be made on the back side as shown above.</p>	<p>* Measure the movement with the crown remaining in its normal position and with the alarm switch OFF.</p> <p>* Start measurement after turning the rotary switch of the tester from 3 mA to $12\mu\text{A}$.</p> <p>● Power consumption of the electronic circuit</p> <p>Under $1.3\mu\text{A}$ → Nondefective</p> <p>Over $1.3\mu\text{A}$ → Replacement of unit of electronic circuit</p>

Checking items	How to check	Result and treatment
11 Check of appearance and functions	<p data-bbox="346 225 813 247">Make a check on the finished watch in the following point:</p> <ul data-bbox="346 254 840 304" style="list-style-type: none">●that the crown or the alarm switch operates in a desired way.●that there is nothing wrong with appearance. 	

CITIZEN WATCH CO., LTD.

Tokyo, Japan