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# ***TECHNICAL INFORMATION***

## **CITIZEN QUARTZ**

**Cal. No. 60 ※※※**

**Cal. No. 61 ※※※**

№ 1  
6070 主作



(Cal. No. 6070X)

## 1. OUTLINE

The product is a thin, analog alarm watch with four hands (hour, minute and second hands + alarm setting hand). The alarm has a snooze alarm function – Cal. 6070A.

If the alarm function is removed the Cal. 6070A can basically be used like other Cal.60/61 series watches. So use this technical information for Cal. 60/61 type watches.

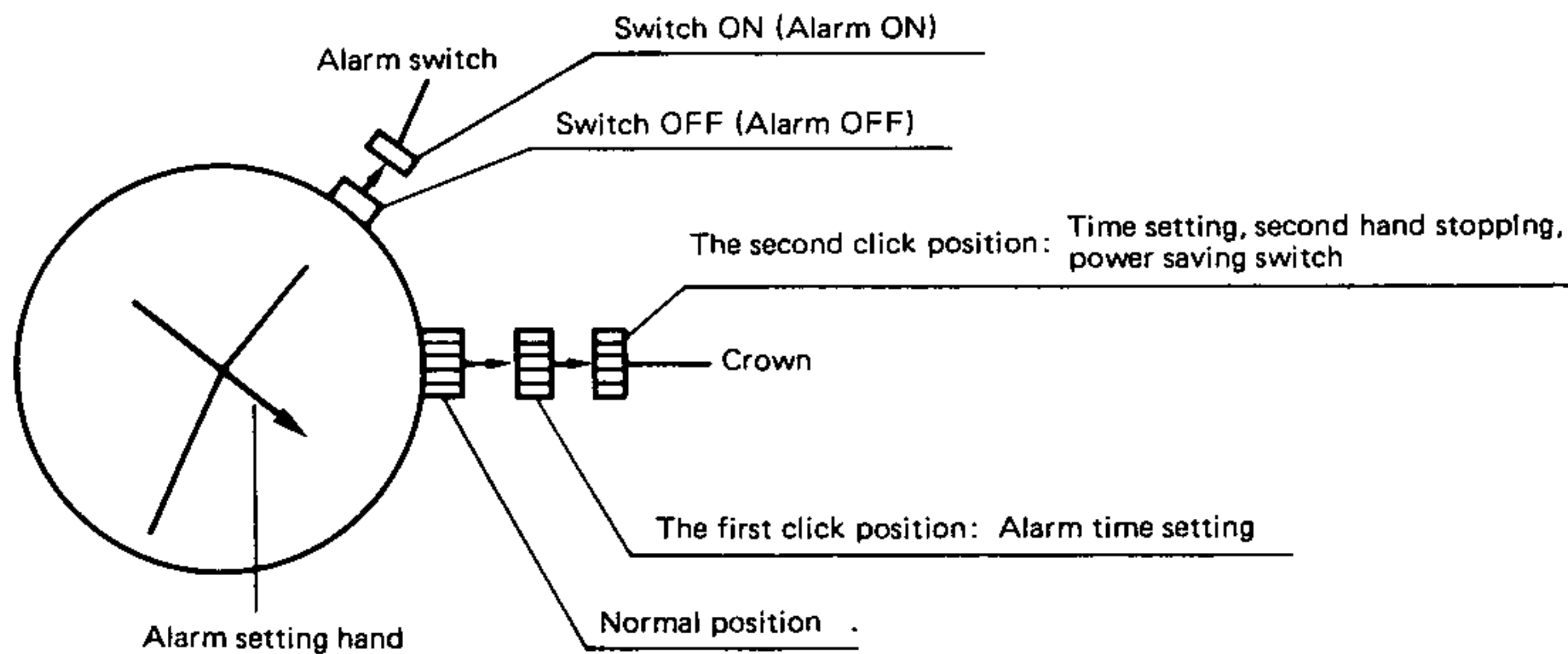
## 2. SPECIFICATIONS

Caliber No.		6000A-00	6010A-00	6020A-00	6030A-00	6070A-01	6100A-00	6110A-00
Type (Analog quart watch)		Three hands		Two hands		Four hands	Three hands	
Module size (mm)		$\phi 18.1 \times 16.1$		15.3 x 17.8 x 2.5 t		$\phi 23.3 \times 3.5$ t	$\phi 23.3 \times 22.6 \times 3.3$ t	
		3.3 t	3.0 t					
Accuracy		$\pm 20$ sec/month (at normal temperatures)						
Oscillation		32,768 Hz						
Integrated circuit		C/MOS-LSI 1 unit			C/MOS-LSI 2 units		C/MOS-LSI 1 unit	
Effective temp. range		$-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ ( $14^{\circ}\text{F} \sim 140^{\circ}\text{F}$ )						
Converter		Bipolar step motor						
Time rate adjustment		D.F.C. (without a control terminal)						
Time rate measurement		10 seconds						
Additional functions	Date (with quick stopping device)	Yes	←	No	←	←	Yes	←
	Day (with quick setting device)	Yes	No	←	←	←	Yes	No
	Bilingual selective display for day of week	No	←	←	←	←	←	←
	Second hand stopping device	Yes	←	No	Yes	←	←	←
	Power saving switch	Yes	←	←	←	←	←	←
	Power cell life indicator	No	←	←	←	←	←	←
	Alarm	No	←	←	←	←	Yes*-1	No
Power cell	Part No.	280-34			280-70		280-34	
	Cell code	SR621SW			SR621W		SR621SW	
	Size	$\phi 6.8$ mm x 2.1 tmm						
	Voltage	1.55 V						
	Capacity	18 mA·H						
	Life	Approx. 2 years			Approx. 1.5 years*-2		Approx. 2 years	
Current consumption		Under $1.3 \mu\text{A}$ (Module)						
Coil resistance		$2.0 \text{ k}\Omega \sim 2.4 \text{ k}\Omega$						
Remarks							*-1 Snooze alarm on a 12 hour basis *-2 If the alarm sounds for 15 second a day	

### ■3. PRECAUTIONS IN HANDLING

- 1) The alarm in this watch begins to sound within the range of  $\pm 5$  minutes of the set alarm time. Note this when setting the alarm.
- 2) When the alarm is not in use or if the watch is not used for a long period of time, keep the alarm switch OFF (in the pushed-in position) in order to secure a long power cell life.
- 3) Use the alarm switch to stop alarm sounds. Because of the snooze alarm mechanism, changing the position of the alarm setting hand cannot cancel the alarm.

### ■4. HANDLING METHOD



#### 1. Setting the time

- 1) Pull the crown out to the second click position when the second hand reaches the 12 o'clock position, so that the second hand stops there.
- 2) Set the hour and minute hands to the correct time by turning the crown either clockwise or counterclockwise.
- 3) Push the crown back to the normal position simultaneously with the time signal.

#### 2. Setting the alarm time

- 1) Pull the crown out to the first click position.
- 2) By turning the crown either clockwise or counterclockwise, set the alarm setting hand to the time at which the alarm is required to sound.  
The alarm setting hand can be turned both clockwise and counterclockwise.
- 3) Pull out the alarm switch to turn the alarm ON. When the actual time reaches the set alarm time, the alarm will go off and continue to produce pips for about 15 seconds. In about three minutes, the alarm will sound again for about 15 seconds. In this way, the alarm will sound and stop sounding several times.
- 4) To stop the alarm sound, push the alarm switch in.  
The alarm is then turned OFF and stops sounding.

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## ■5. PRECAUTIONS IN DISASSEMBLY AND ASSEMBLY

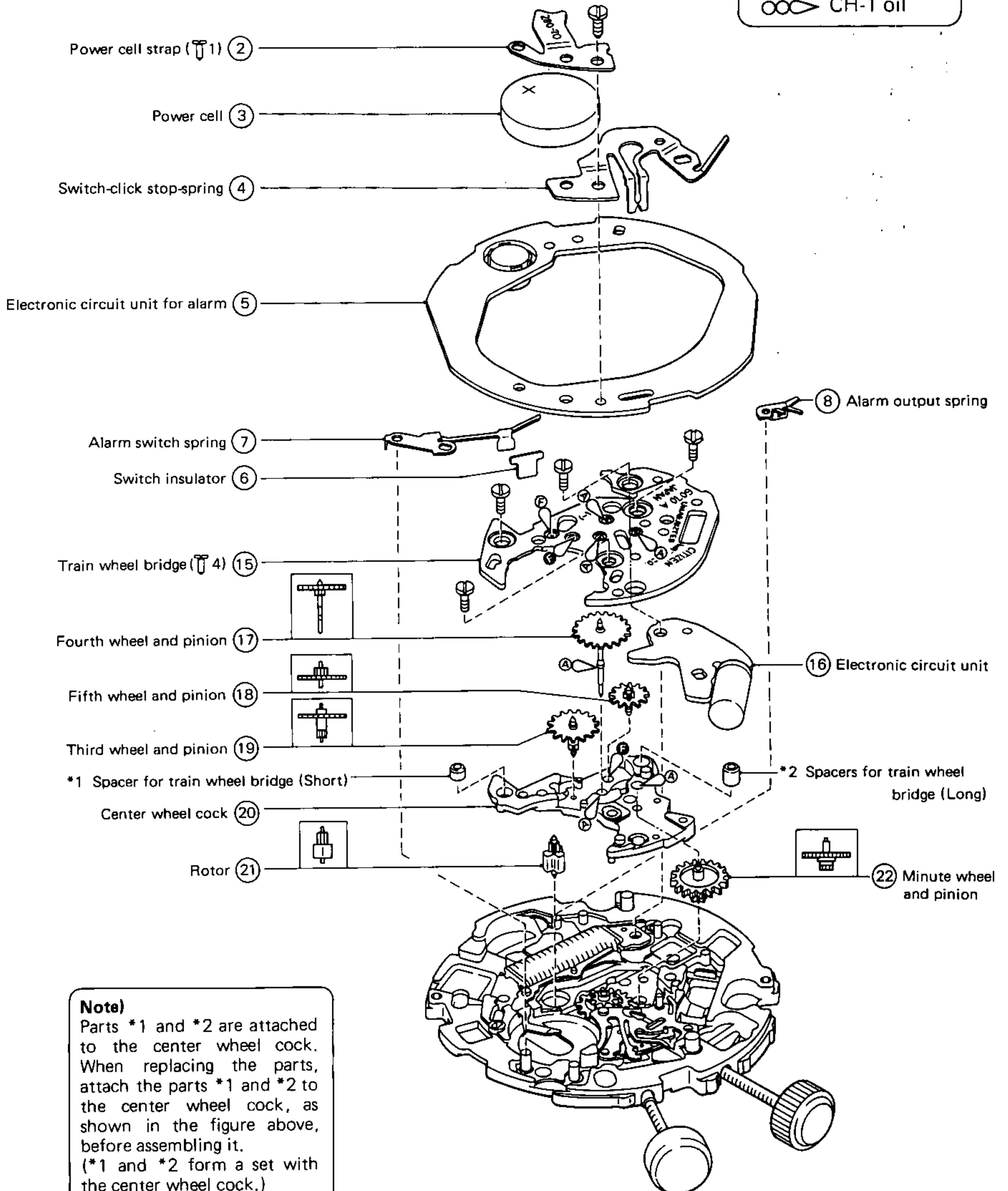
1. Remove the unlocking wheel holder after removing the power cell strap screw.
2. Because the unlocking wheel, rotor, fifth wheel and pinion, third wheel and pinion and minute wheel and pinion are made of plastics, do not grasp their gears and pinions directly with tweezers.
3. Mount the spacer for the setting stem and the setting lever spring accurately so they are not unstable.
4. When mounting the center wheel cock, be careful not to crush the rotor's pinion.
5. Make sure that the proper engagement is attained between the 3rd wheel and pinion and the cannon pinion with driving wheel, between the 3rd wheel and pinion, and the 4th wheel and pinion, and between the 4th wheel and pinion, and the 5th wheel and pinion.
6. When mounting the train wheel bridge, be careful not to damage the pivot of each wheel.
7. When mounting the unlocking wheel, be careful that its gear is not damaged by the unlocking correcting wheel.
8. Before mounting the electronic circuit unit for the alarm, make sure that the switch insulator has been mounted.

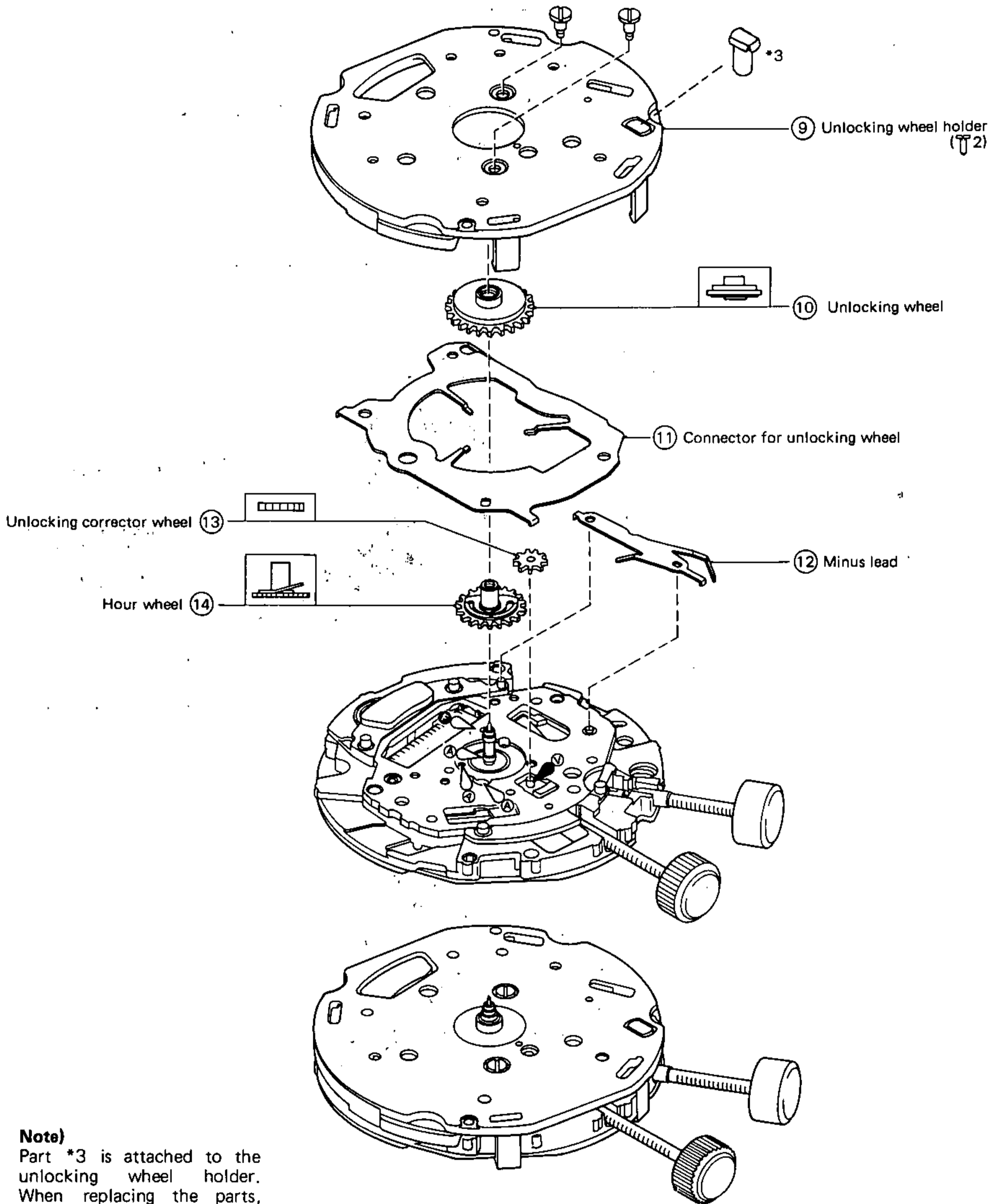
## 6. DISASSEMBLY AND ASSEMBLY OF THE MODULE

Disassembling procedure: ① → ③③  
 Assembling procedure: ③③ → ①

● Lubrication markings

- Ⓐ A-Lube oil
- Ⓥ V-Lube oil
- Ⓕ F-Lube oil
- Ⓞ CH-1 oil

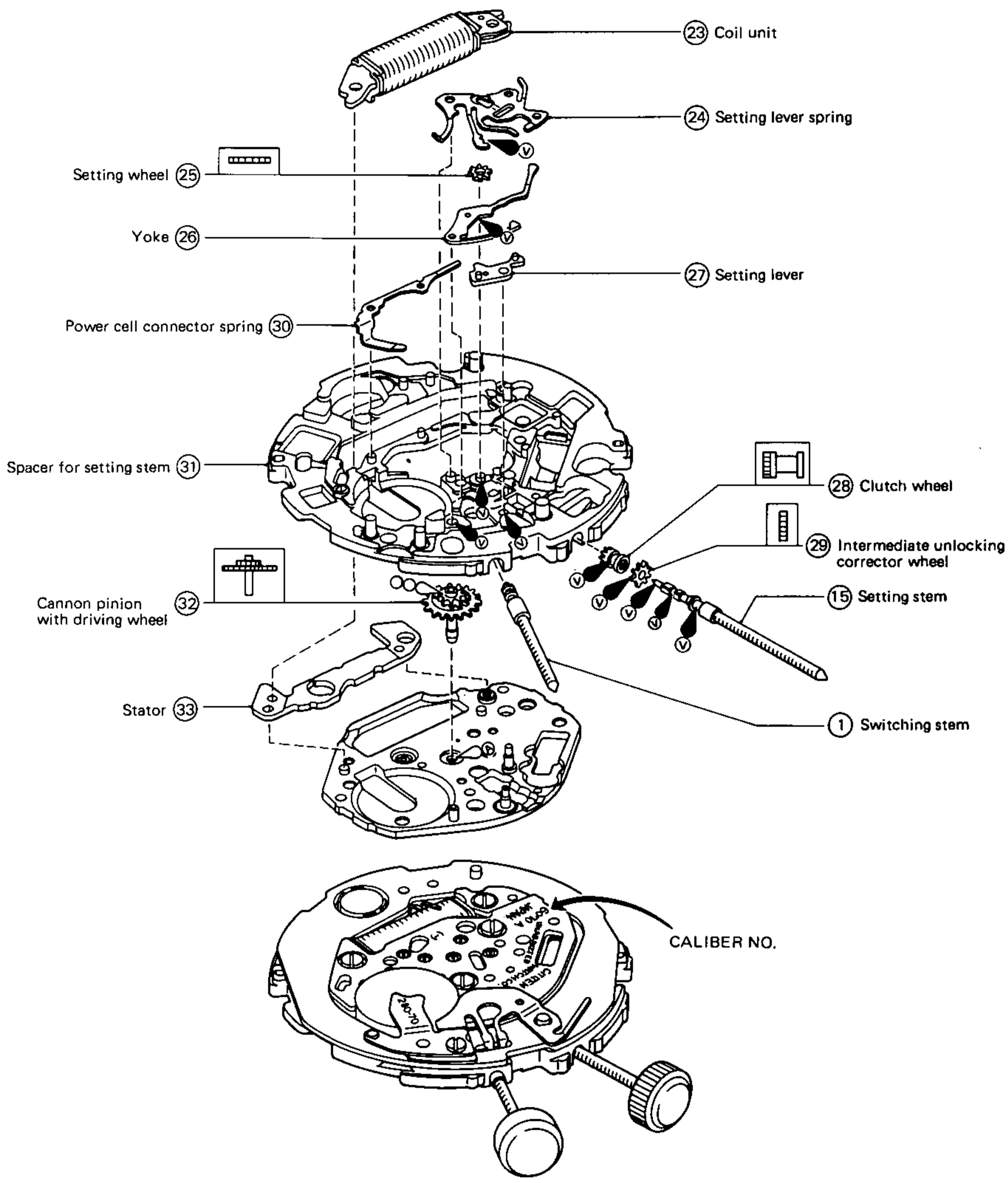




**Note)**

Part \*3 is attached to the unlocking wheel holder. When replacing the parts, attach part \*3 to the unlocking wheel holder, as shown in the above figure, before assembling it. (\*3 forms a set with the unlocking wheel holder.)

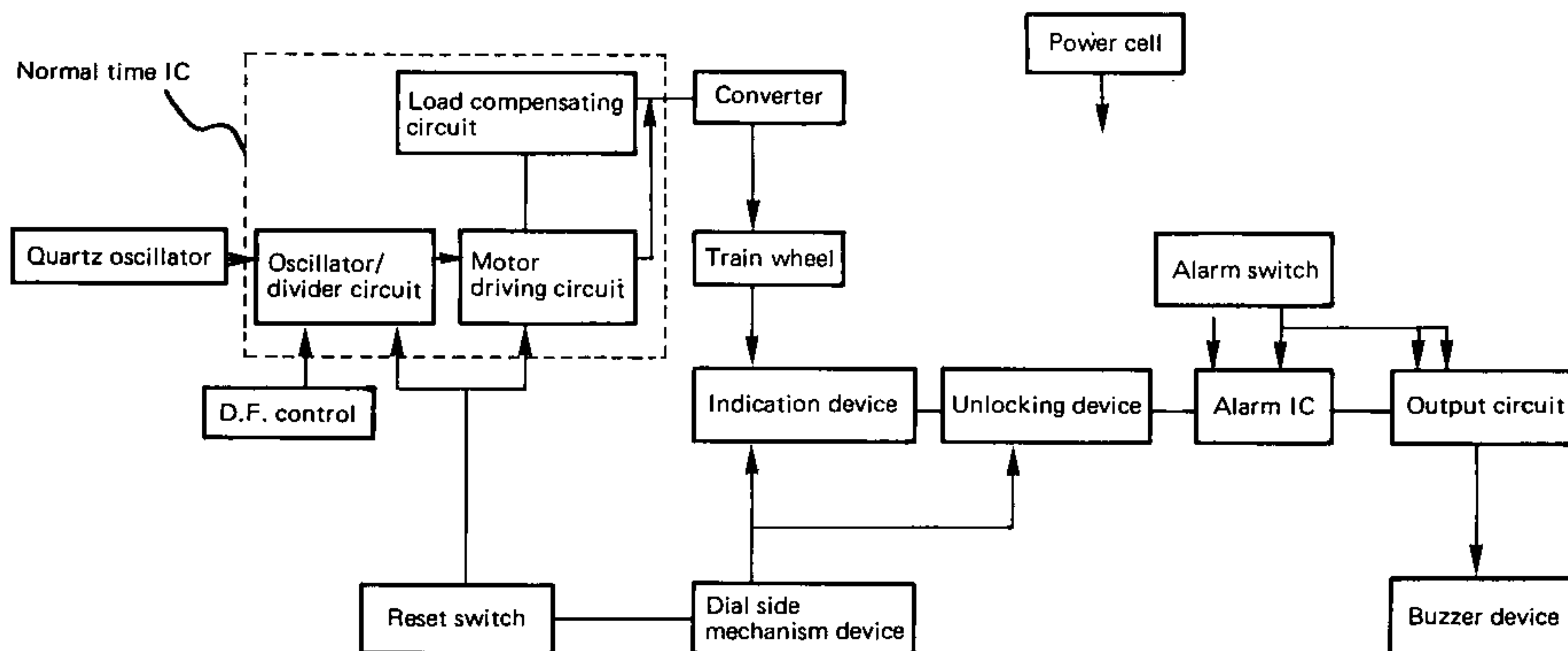




## 7. ALARM MECHANISM

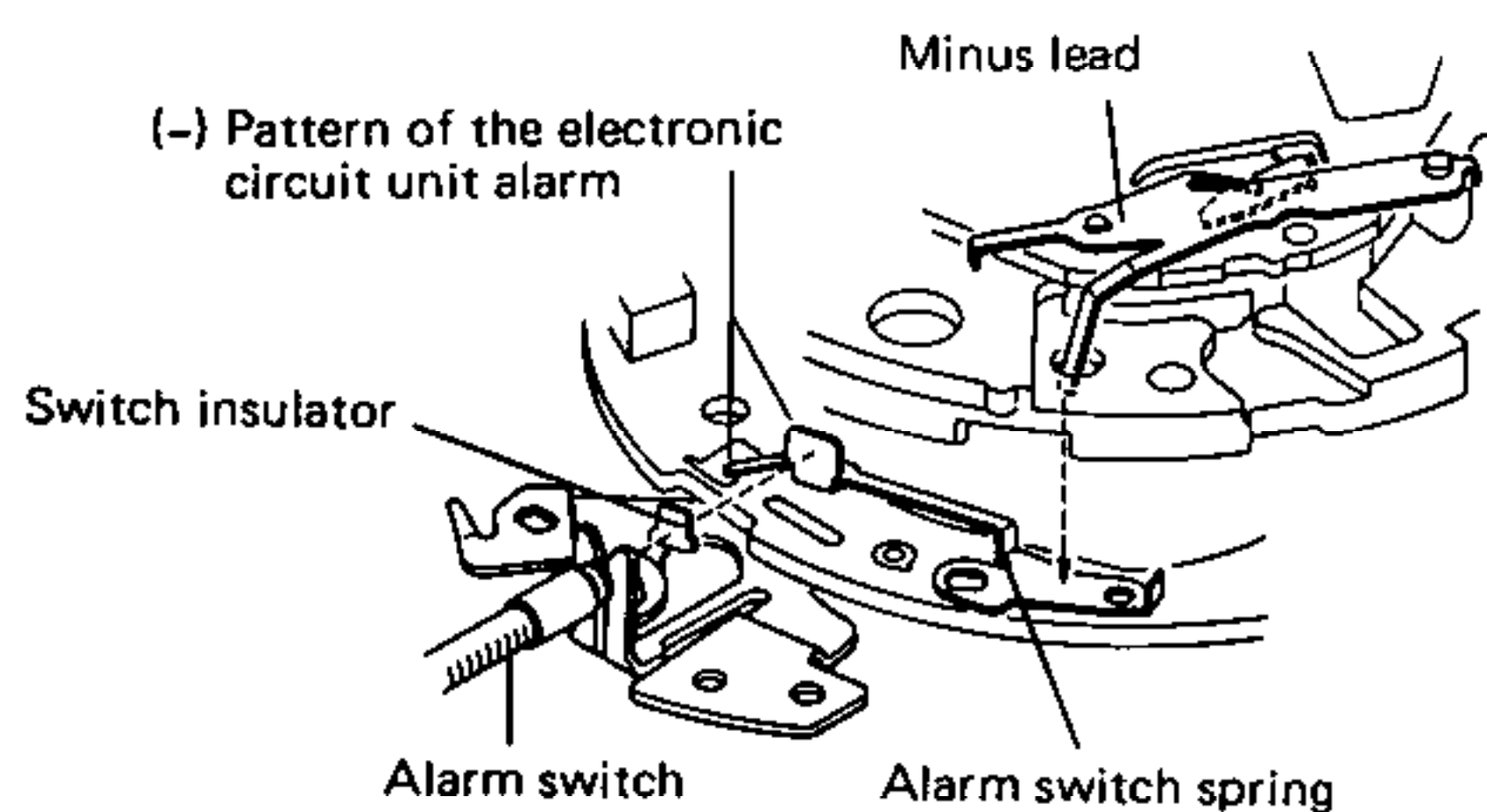
The conventional alarm mechanism uses a quartz oscillator as the oscillation source for the alarm. The Cal. 6070\* uses an alarm IC as the oscillation source.

### 1. Construction Chart for the Cal. 6070\*



### 2. Alarm Mechanism

#### ① ON/OFF alarm switch



One end of the minus lead is connected to the power cell connector (-). The other end of the minus lead is connected to the alarm switch spring.

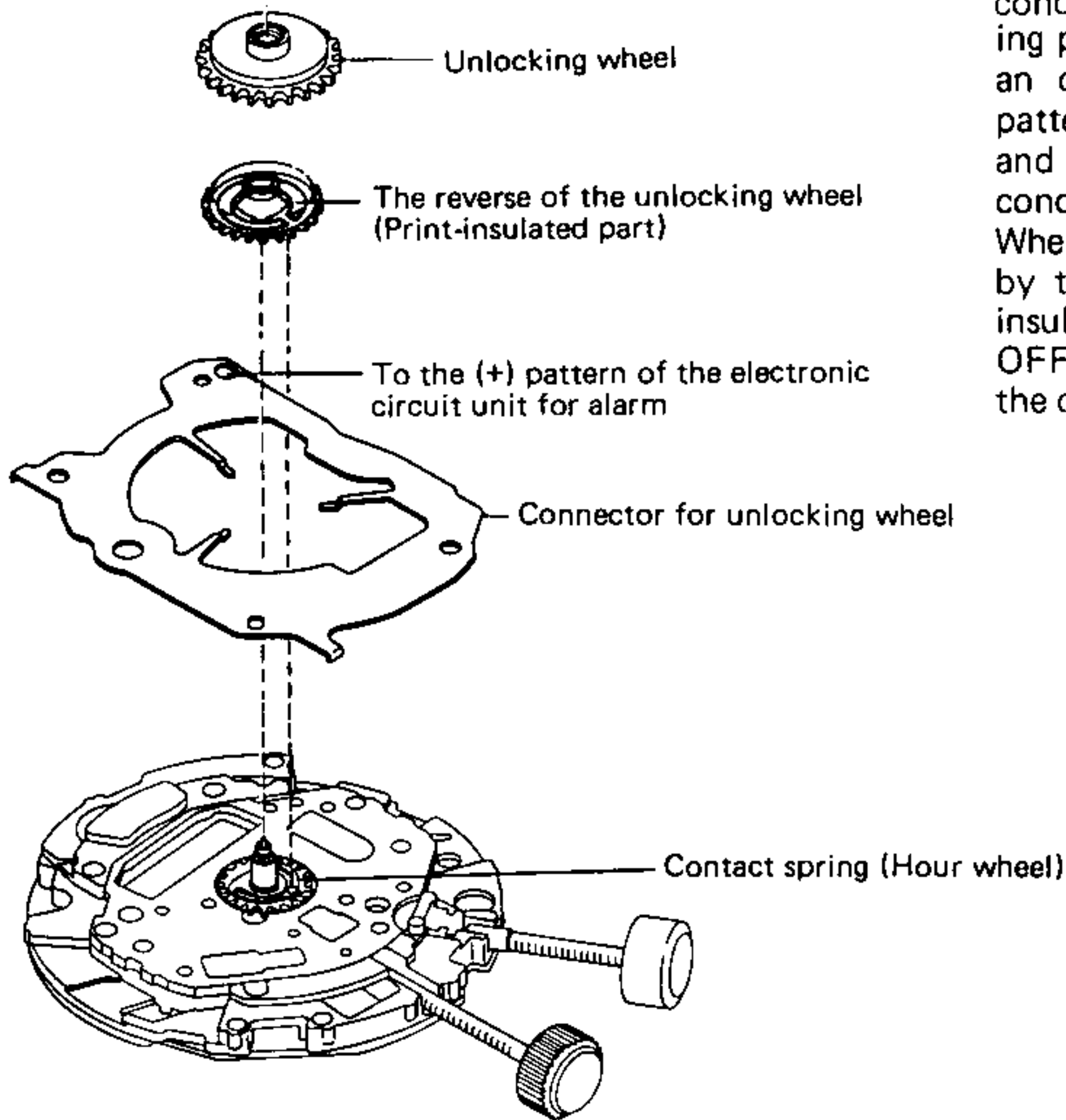
The alarm switch spring, therefore, is always at the (-) side. When the alarm switch is in the pushed-in position, the end of the alarm switch spring is detached from the (-) pattern of the electronic circuit unit for alarm. - OFF.

When the alarm switch is pulled out, the end of the alarm switch spring comes into contact with the (-) pattern. - ON.

The switch insulator is used to prevent a short circuit between the alarm switch spring (-) and the alarm switch (+).



② **Switching ON/OFF with the unlocking device (Unlocking switch ON/OFF)**

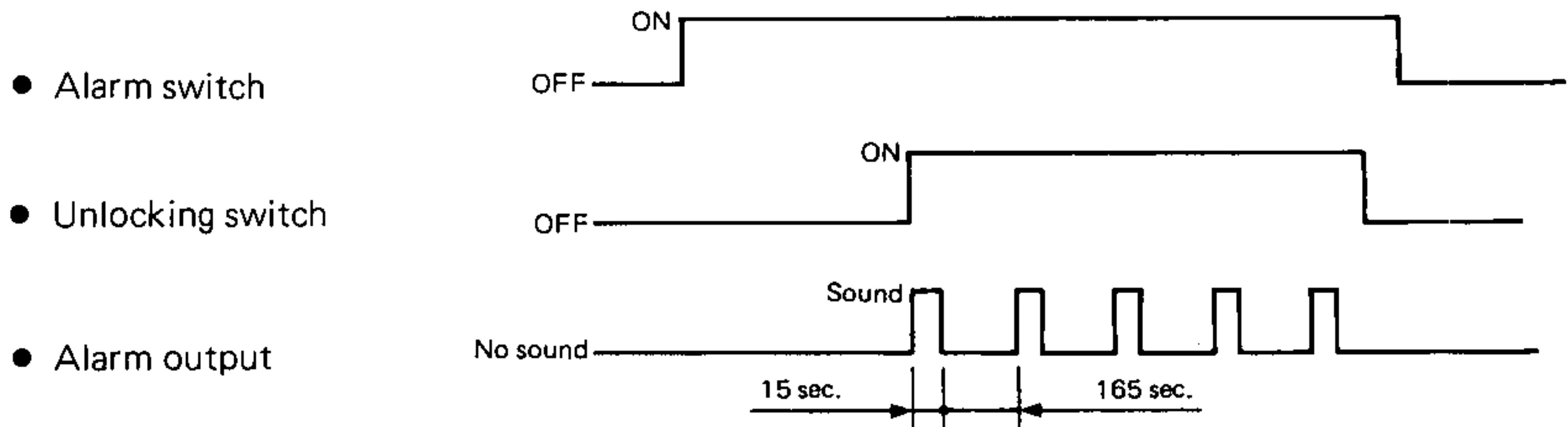


On the reverse side of the unlocking wheel, the conductive part (gold) is partly covered with insulating print. The connector for the unlocking wheel has an outside spring, which is connected to the (+) pattern of the electronic circuit unit for the alarm, and three inside arms, which are connected to the conductive part (gold) of the unlocking wheel. When the tip of the contact spring, which is moved by the rotation of the hour wheel, is on the print-insulated part of the unlocking wheel, the switch is OFF, and when the tip of the contact spring touches the conductive part, the switch is turned ON.

**The alarm begins to sound when both switches, 1 and 2 are ON.**

③ **Relations between the switches and the alarm**

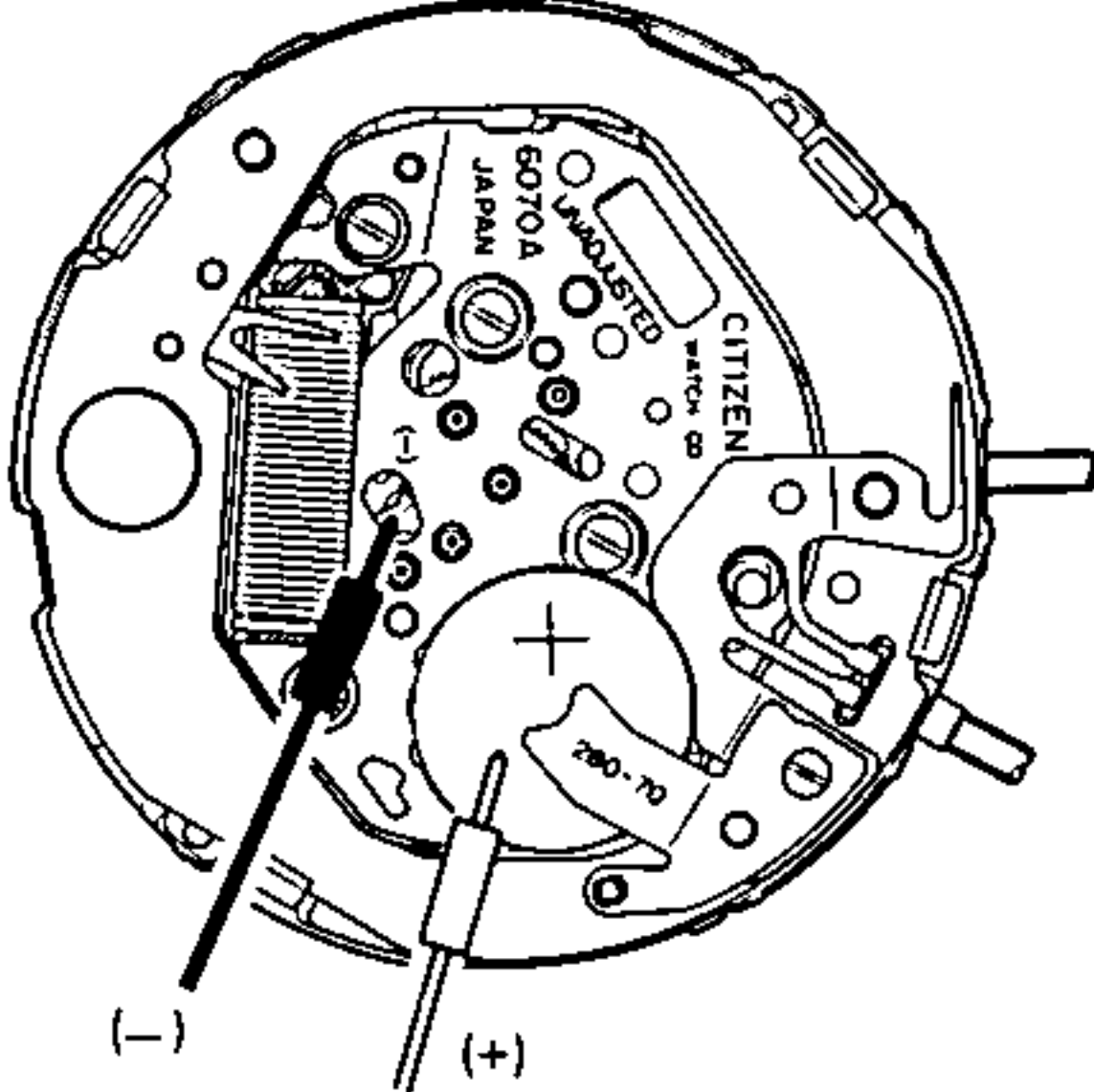
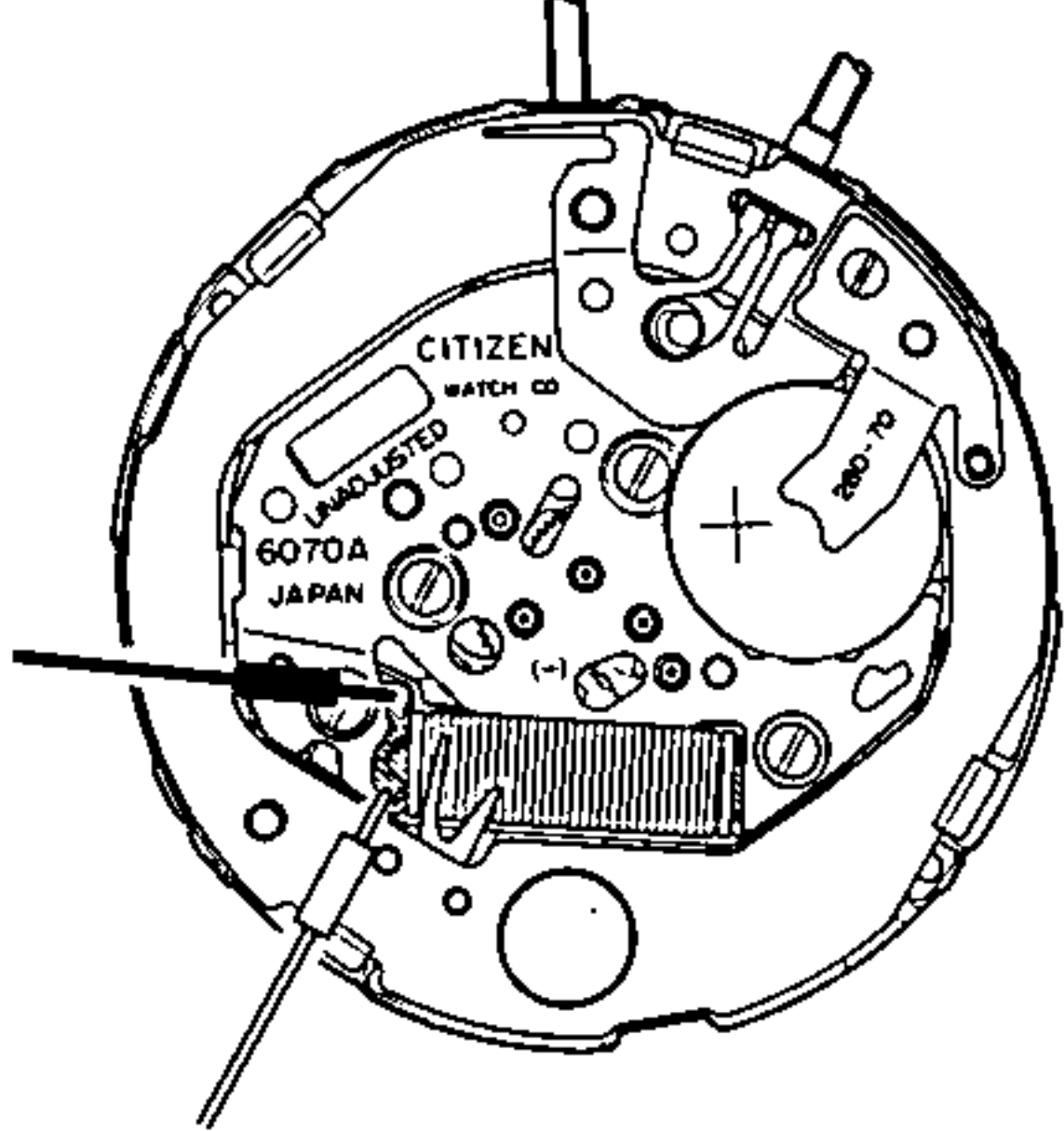
The alarm switch, the unlocking switch and the alarm output have the relations illustrated below.

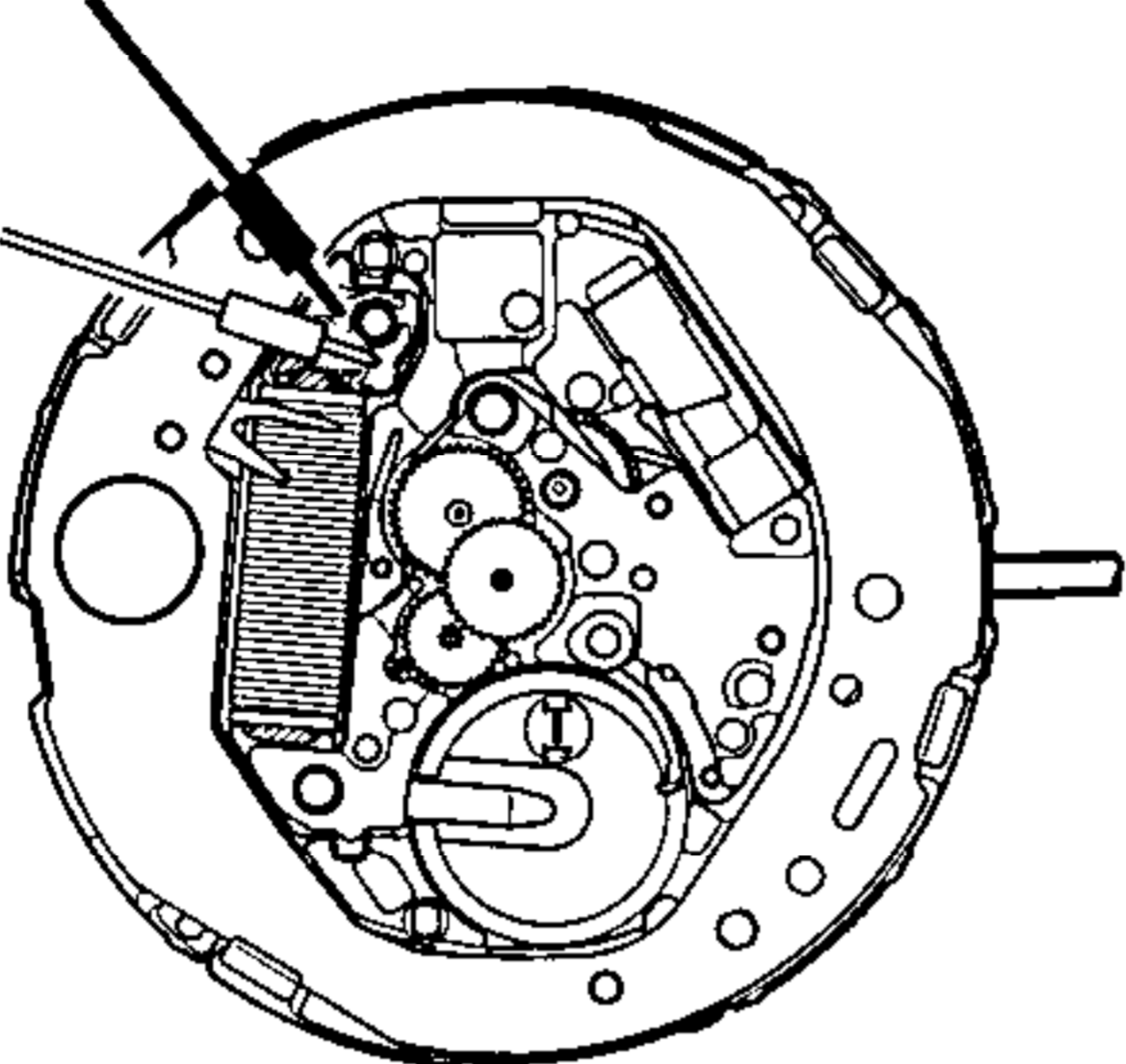
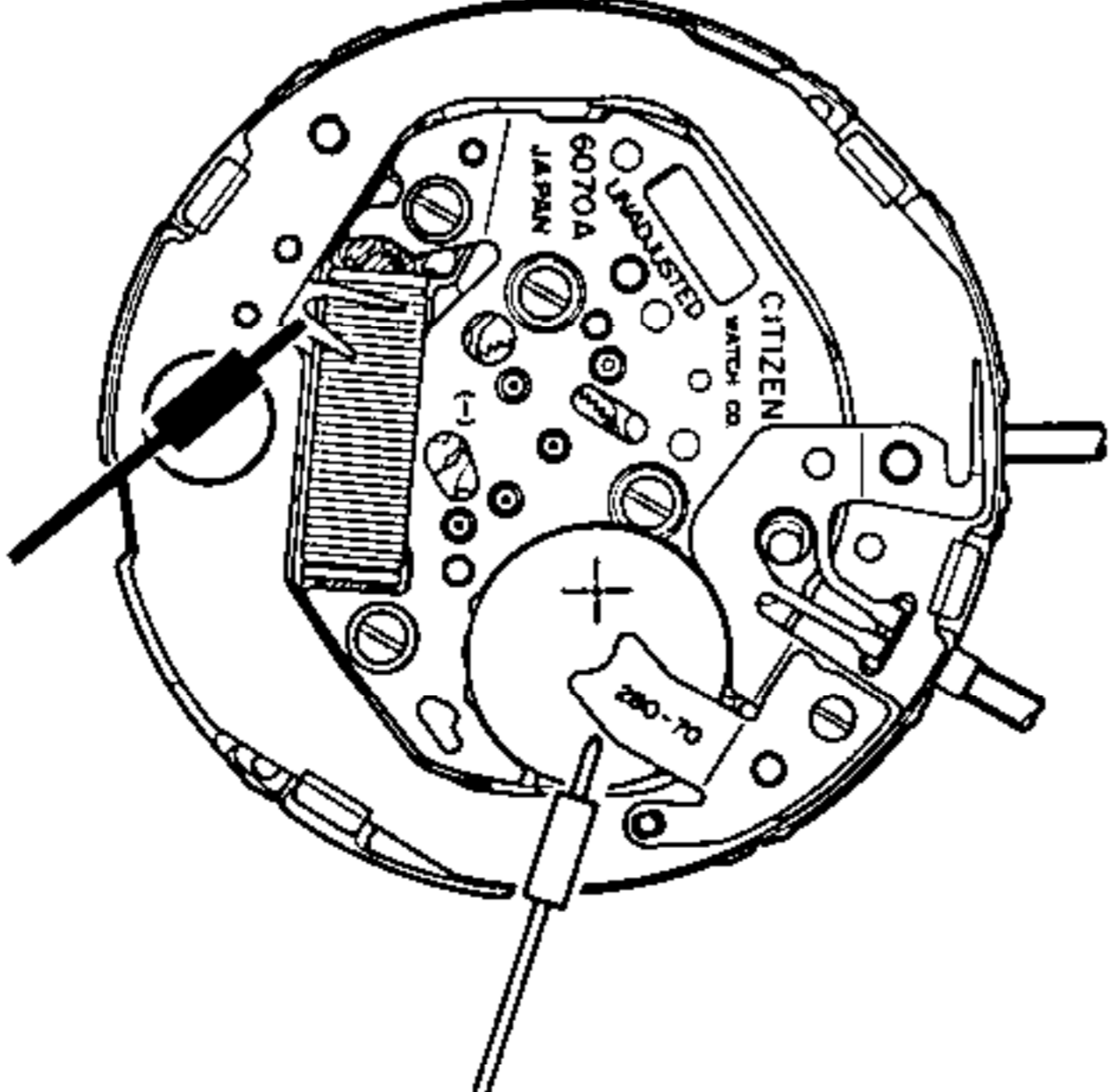


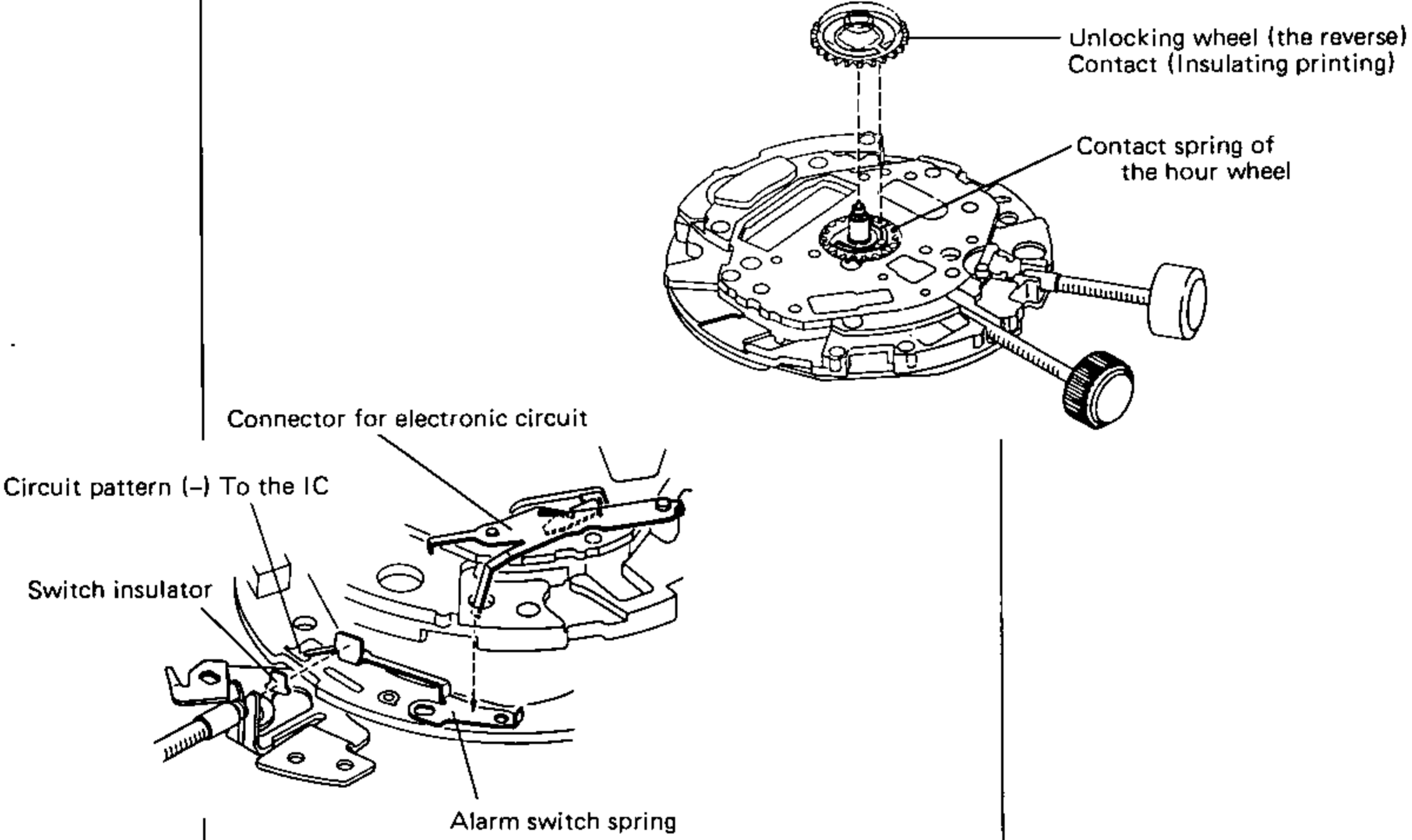
During the alarm time, the sound continues for 15 seconds on average (about 10–20 seconds), followed by 165 seconds on average (about 110–210 seconds) of soundless alarm, and this process is repeated 5 times on average (3–7 times). — Snooze alarm.

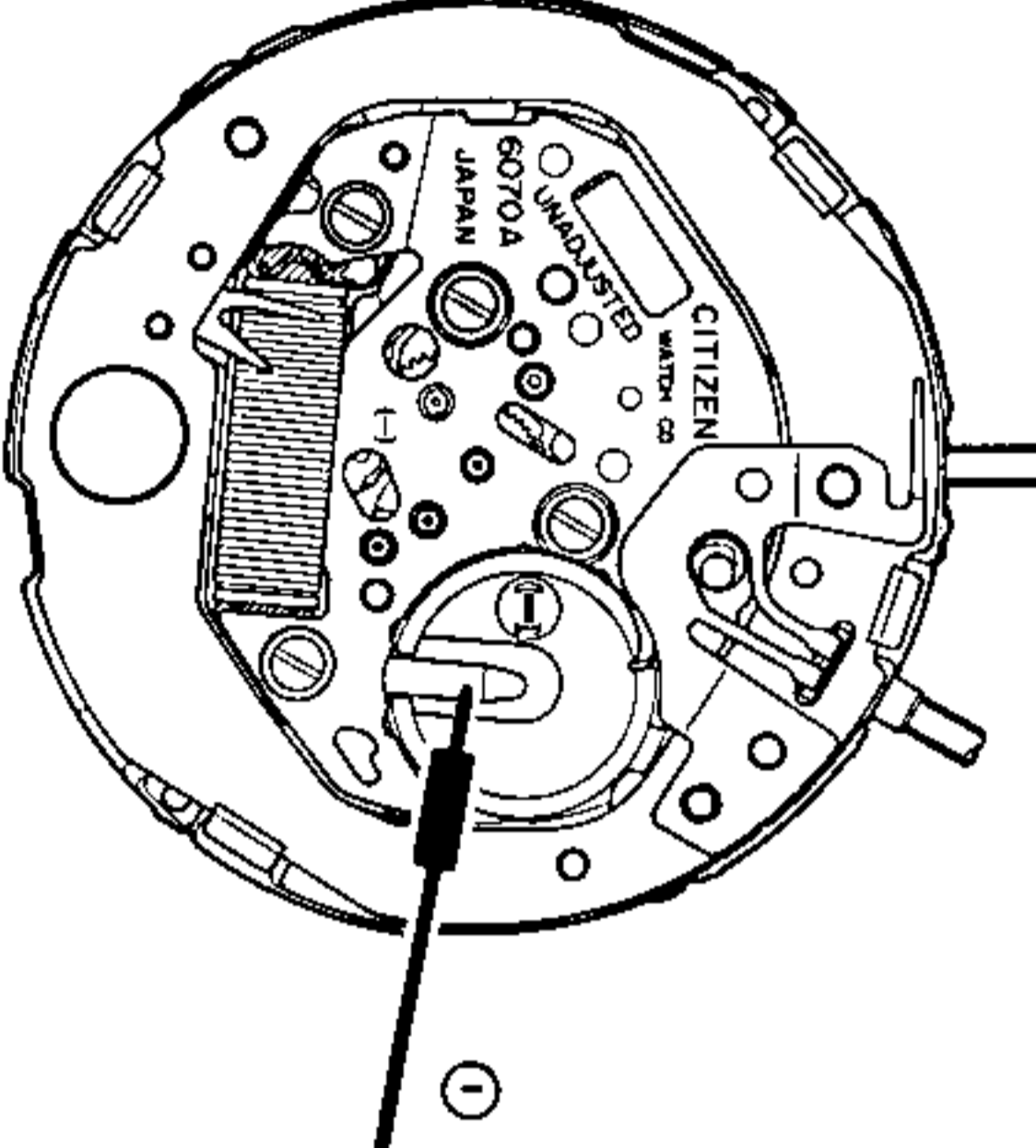
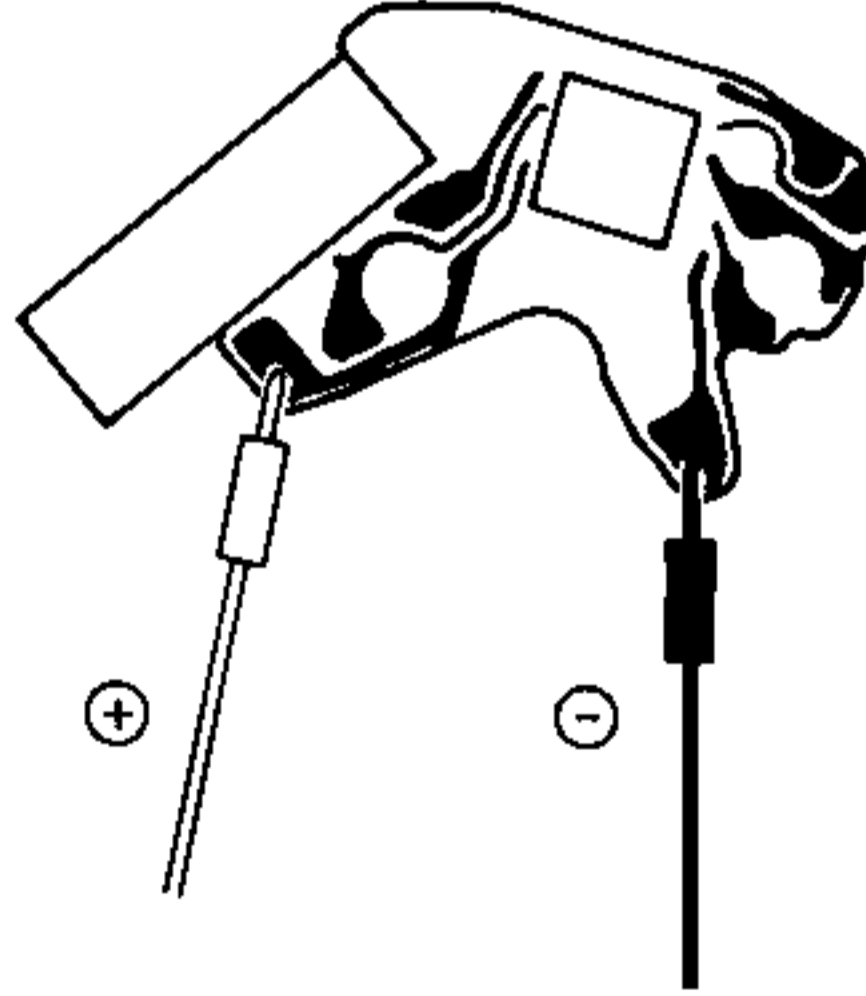
The variations between the figures in parentheses are due to the influence of frequency variation etc.



Check Items	Method	Results and Repair Procedure
<p>① Measuring power cell voltage</p>	<p>[Refer to Technical Manual, Basic Course II-1-a for the setting procedure of the tester]</p> <p>(Parts to be measured)</p> 	<p>Measure the voltage on the complete module.</p> <p><b>Over 1.5V</b> → Non-defective</p> <p><b>Under 1.5V</b> → Measure the power cell separately</p> <p>Measurement of the separate power cell</p> <p><b>Over 1.5V</b> → Check the connection parts</p> <p><b>Under 1.5V</b> → Replace the power cell</p>
<p>② Confirming the output signal</p>	<p>[Refer to Technical Manual, Basic Course II-1-b for the setting procedure of the tester]</p> <p>(Parts to be measured)</p> 	
<p>③ Checking the connections</p>	<p>[Refer to the analog part of Technical Manual, Basic Course II-2-a.]</p>	

Check Items	Method	Results and Repair Procedure
<p>④ Measuring coil resistance</p>	<p>[Refer to Technical Manual, Basic Course II-1-c for the setting procedure of the tester]</p> <p>(Parts to be measured)</p> 	<p><b>2.0kΩ~2.4kΩ</b> → Non-defective</p> <p>Outside range of 2.0kΩ~2.4kΩ → Replace the coil unit</p>
<p>⑤ Checking the train wheel</p>	<p>[Refer to Technical Manual, Basic Course II-2-b.]</p>	
<p>⑥ Checking the dial side mechanism</p>	<p>[Refer to Technical Manual, Basic Course II-2-c.]</p>	
<p>⑦ Measuring and adjusting the time rate</p>	<p>Measurements are made in a 10 second range. Since this watch uses D.F.C. and has no control terminal, the time rate cannot be adjusted in the field.</p>	<p>If the watch loses or gains substantial time, replace the electronic circuit unit.</p>
<p>⑧ Confirmation of usage conditions of watch</p>	<p>[Refer to Technical Manual, Basic Course <u>II-1-f</u>]</p> <p style="text-align: center;">II-2-e</p>	
<p>⑨ Checking the alarm mechanism</p>	<p>1 Confirm the alarm output Reproduce the alarm condition, using the alarm time setting method, to confirm the alarm output.</p> <p>* The alarm of this watch continues to sound for about 15 seconds. Then, about three minutes later, the alarm begins to sound again. (The snooze alarm function)</p> <p>(Parts to be measured)</p> 	<p>The tester pointer swings → Non-defective</p> <p>The tester pointer does not swing → Replace the electronic circuit unit for the alarm</p>

Check Items	Method	Results and Repair Procedure
	<p>2. Confirm the set condition of the component parts</p> <ul style="list-style-type: none"> <li>● Confirm whether the electronic circuit unit for the alarm and the alarm output spring have been correctly mounted.</li> <li>● Confirm whether there are cracks or chips in the piezo-electric element (white color) which is attached directly to the inside of the case back.</li> </ul> <p>3. Confirm the condition of the alarm switch mechanism</p> <p>1) Is the ON/OFF function of the alarm switch normal?</p> <ul style="list-style-type: none"> <li>● Has the switch insulator been correctly mounted?</li> <li>● Is the contact between the end of the alarm switch spring and the pattern of the electronic circuit unit for the alarm normal? (Deformation of the alarm switch spring, dust and stains on it, etc.)</li> <li>● Is the switch click stop spring deformed?</li> <li>● Are there any deformations, dust or stains on the minus lead?</li> </ul> <p>2) Confirm the alarm mechanism</p> <ul style="list-style-type: none"> <li>● Are there any deformations in the unlocking lead, unlocking wheel and hour wheel?</li> </ul> <p>* Give special care to peeling the contact print on the unlocking wheel, to deformation of the contact spring of the hour wheel, etc.</p> <ul style="list-style-type: none"> <li>● Are there any dust stains on these parts?</li> </ul>	 <p>Unlocking wheel (the reverse) Contact (Insulating printing)</p> <p>Contact spring of the hour wheel</p> <p>Connector for electronic circuit</p> <p>Circuit pattern (-) To the IC</p> <p>Switch insulator</p> <p>Alarm switch spring</p>

Check Items	Method	Results and Repair Procedure
<p>⑩ Measuring current consumption</p> <p>Avoid measuring current consumption under an incandescent lamp or direct sunshine. If measured under these conditions, the current value may increase.</p>	<p>[Refer to Technical Manual, Basic Course II-1-f for the setting procedure of the tester]</p> <p>1. Measuring the current consumption of the complete module.</p> <p>(Parts to be measured)</p>  <p>2. Measuring the current consumption of the separate electronic circuit unit.</p> <p>* Set the tester in the same way as 1.</p> 	<p><b>Under 1.3<math>\mu</math>A</b> → Non-defective</p> <p><b>1.3<math>\mu</math>A</b> → Measure the separate electronic circuit unit</p> <p><b>Under 0.5<math>\mu</math>A</b> → Check the train wheel</p> <p><b>Over 0.5<math>\mu</math>A</b> → Replace the electronic circuit unit</p>
<p>⑪ Checking appearance and functions</p>	<p>[Refer to Technical Manual, Basic Course II-2-f.]</p> <ol style="list-style-type: none"> <li>1. Are there any dust or stains on the surface of the dial?</li> <li>2. Does the crown operate properly?</li> <li>3. Are there any abnormalities in the second hand stopping and time setting operations when the crown is pulled out to the second click position?</li> </ol>	



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