

# ***TECHNICAL INFORMATION***

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## **CITIZEN QUARTZ**

### **Cal. No. 31 ❖❖❖**



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## §1. OUTLINE

**CAL. 3100\*** ..... A multi-time analog quartz watch which indicates the main time (With a sweep hand) and the other three times (With hour and minute hands).

**CAL. 3110\*** ..... A watch having the same specifications as CAL. 3100\*, except the three minute hands of the sub-watches.

## §2. SPECIFICATIONS

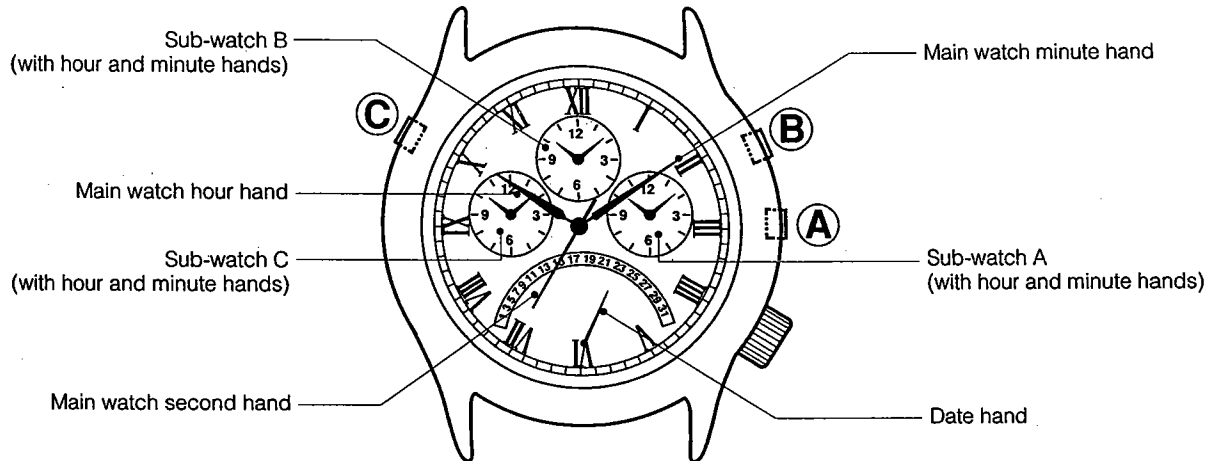
Caliber No.		3100A-00	3110A-00
Type		Multi-hand analog quartz watch (With sweep hand)	
Module size (mm)		ø23.1 x 3.4 <sup>t</sup>	
Accuracy (At normal temperature)		±20 sec/month	
Oscillation		32,768Hz	
IC		C/MOS-LSI 1 unit	
Effective temperature range		-10°C ~ +60°C	
Converter		Bipolar step motor	
Adjustment of time rate		D.F.C. (Not adjustable in market)	
Measurement gate		10 sec	
Additional functions		<ul style="list-style-type: none"> <li>• Date hand (with quick date setting device)</li> <li>• Three sub-watches Indication by hour and minute hands</li> <li>• Time difference correcting function</li> </ul>	<ul style="list-style-type: none"> <li>• Date hand (with quick date setting device)</li> <li>• Three sub-watches Indication by hour hand</li> <li>• Time difference correcting function</li> </ul>
Power cell	Part No.	280-73	
	Symbol of power cell	SR616SW	
	Nominal voltage	1.55 V	
	Nominal capacity	16mAH	
	Lifetime	Approx. 2 years	

### §3. HANDLING METHOD

#### A. Features

- The press of a button permits the simultaneous display of times in three other cities or regions on the sub-watches (12-hour time display).
- One touch of a button enables correction for time differences in one hour increments without stopping the watch.

#### B. Name of part



\* Sub-watches A, B and C do not have a minute hand on caliber 3110.

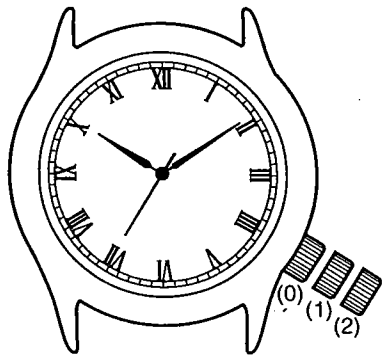
- Buttons (A), (B), and (C) are for correcting time differences.
- Sub-watches A, B, and C run in synchronize with the main watch.
- The watch's date hand indicates the date in the home time of the main watch.

#### C. Setting the watch

##### Example

Assume a person in New York wanted to set the New York time at 8:20 (a.m.), and the times in Tokyo, Paris, and London.

##### 1. Setting the main watch to home time

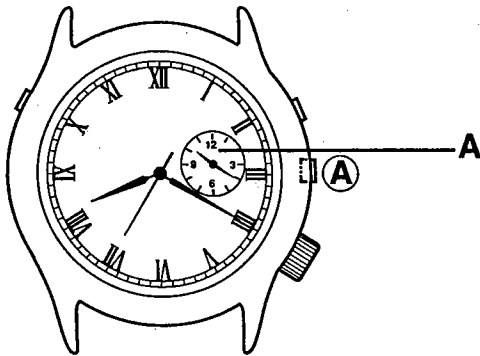


To set the main watch to the current New York time:

1. When the second hand is on "0" sec., move the crown to position (2) to stop the second hand.
2. Turn the crown clockwise so that the minute and hour hands rotate until the date changes, which will be about 12:00 a.m. Continue rotating the crown until you reach 8:20 a.m. The hour and minute hands of the main watch will rotate in synchronize with the hour and minute hands of the sub-watches.
3. Push the crown back in at position (0).

## 2. Setting the sub-watch (Time difference adjustment)

a) Sub-Watch A



To set the sub-watches to the current time in Tokyo, Paris, and London:

1. Use the following time differential chart to determine the time difference for each city.

For people in Region A setting a sub-watch to the current time in Region B.

**Region B (the time difference from G.M.T) – Region A (the time difference from G.M.T) = The current time for Region B**

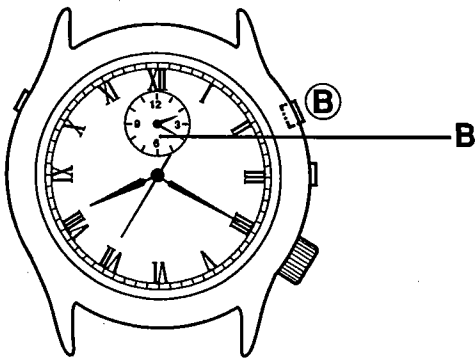
### TIME DIFFERENCES FROM GREENWICH MEAN TIME (GMT)

City	Daylight-savings time	Other cities	Difference from UTC (GMT)
LONDON	○	Casablanca, Dakar	0
PARIS	○	Rome	+1
CAIRO	○	Athens, Istanbul	+2
MOSCOW	○	Mecca, Nairobi	+3
DUBAI	–		+4
KARACHI	–		+5
DACCA	–		+6
BANGKOK	–	Jakarta	+7
HONG KONG	–	Singapore, Beijing	+8
TOKYO	–	Seoul	+9
SYDNEY	○	Guam	+10
AUCKLAND	○	Fiji Islands	+12
HONOLULU	–		–10
ANCHORAGE	○	Dawson (Canada)	–9
LOS ANGELES	○	San Francisco	–8
DENVER	○	Edmonton (Canada)	–7
CHICAGO	○	Mexico city	–6
NEW YORK	○	Washington, D.C., Montreal	–5
CARACAS	–	Santiago (Chile)	–4
RIO DE JANEIRO	○	Buenos Aires	–3

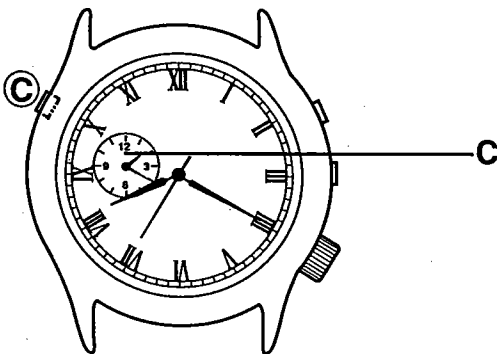
\* Cities or regions that use Daylight Saving Time in the summer are denoted by a circle.

\* The time differences by country and Daylight Savings Time may be changed depending on the country.

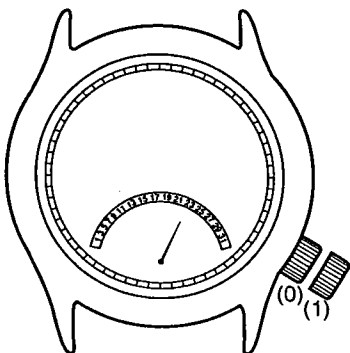
### b) Sub-Watch B



### c) Sub-Watch C



## 3. Setting the date



### Example:

$$\text{Tokyo}(+9) - \text{New York}(-5) = (+9) - (-5) = +14$$

Tokyo is 14 hours ahead of New York, or 10:20(p.m.).

\* Use this method to determine the time difference from the current time in Paris and London.

$$\text{Paris}(+1) - \text{New York}(-5) = +6 \rightarrow \text{Paris 2:20(p.m.)}$$

$$\text{London}(0) - \text{New York}(-5) = +5 \rightarrow \text{London 1:20(p.m.)}$$

2. Set the current time for each city on the sub-watches.

The time can be set regardless of the position of the crown.

By pressing any button once, the hour hand on the sub-watch moves in one-hour increments in a counterclockwise direction.

\* The sub-watch minute hand always turns in synchronise with the main watch minute hand. It cannot be adjusted.

\* There are no minute hands on the Caliber 3110 sub-watches A, B or C.

- a) Set current Tokyo time 10:20 (p.m.) on sub-watch A.  
Press Button **(A)** until the sub-watch A hour hand passes 10:00 (p.m.).
- b) Set current Paris time 2:20 (p.m.) on sub-watch B.  
Press Button **(B)** until the sub-watch B hour hand passes 2:00 (p.m.).
- c) Set current London time 1:20 (p.m.) on sub-watch C.  
Press Button **(C)** until the sub-watch C hour hand passes 1:00 (p.m.).

1. Pull out the crown to position (1).
2. Turn the crown until the desired date appears.

Each turn of the crown advances the date by one day.

Nothing happens when the crown is turned backwards.

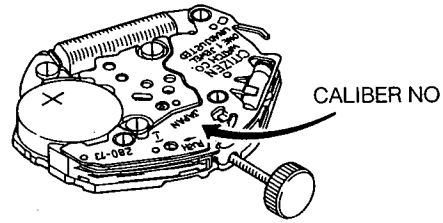
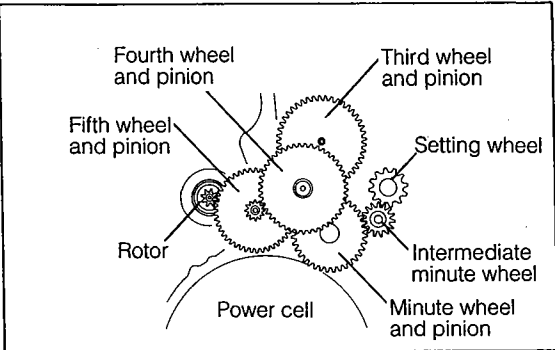
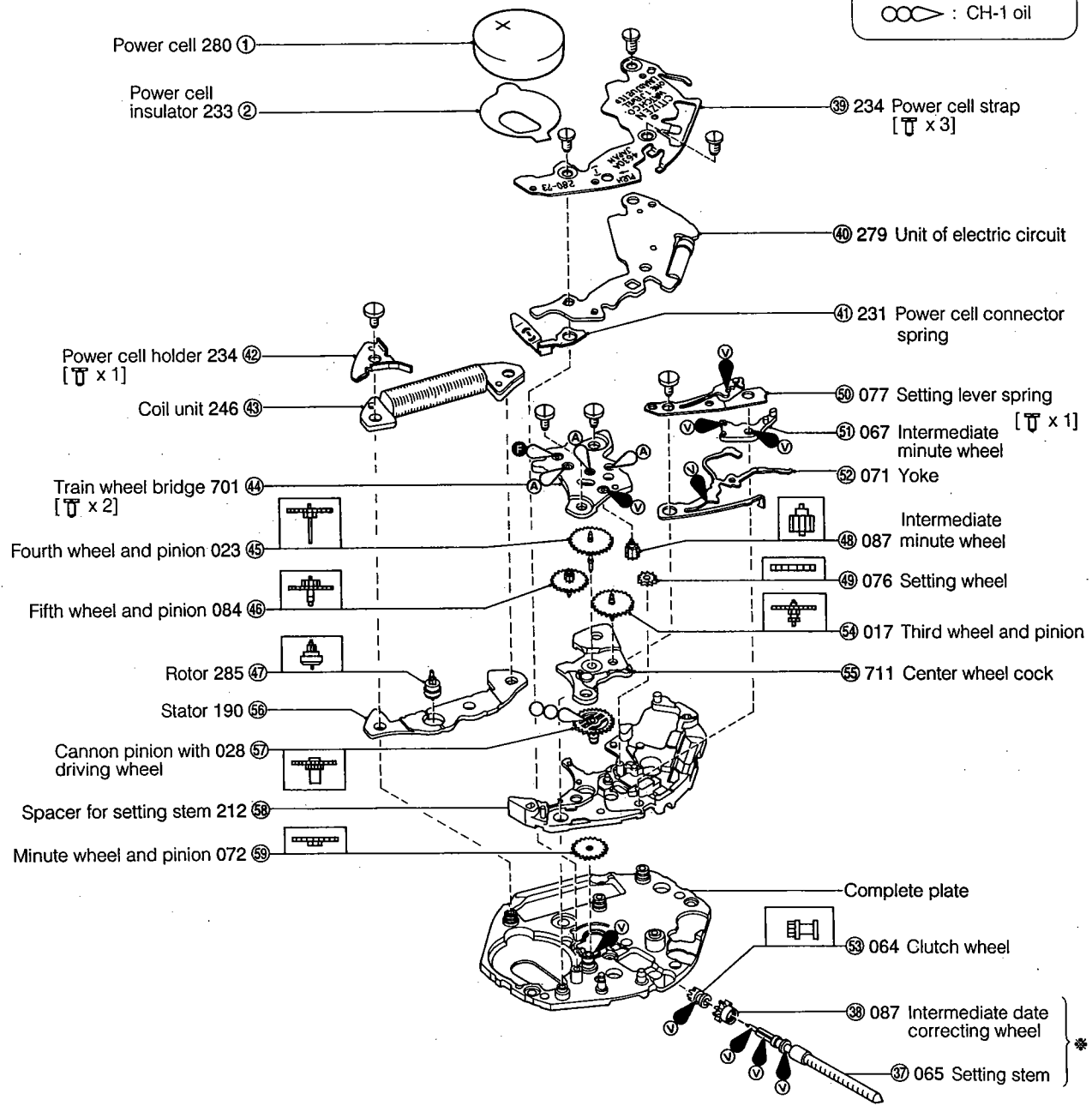
\* Use the crown to set the date to the first of the next month for those months with 30 days and February.

\* Do not set the date between 7:00 pm and 1:00 am because the date may not change properly.

# §4. DISASSEMBLY, ASSEMBLY AND LUBRICATION OF MODULE

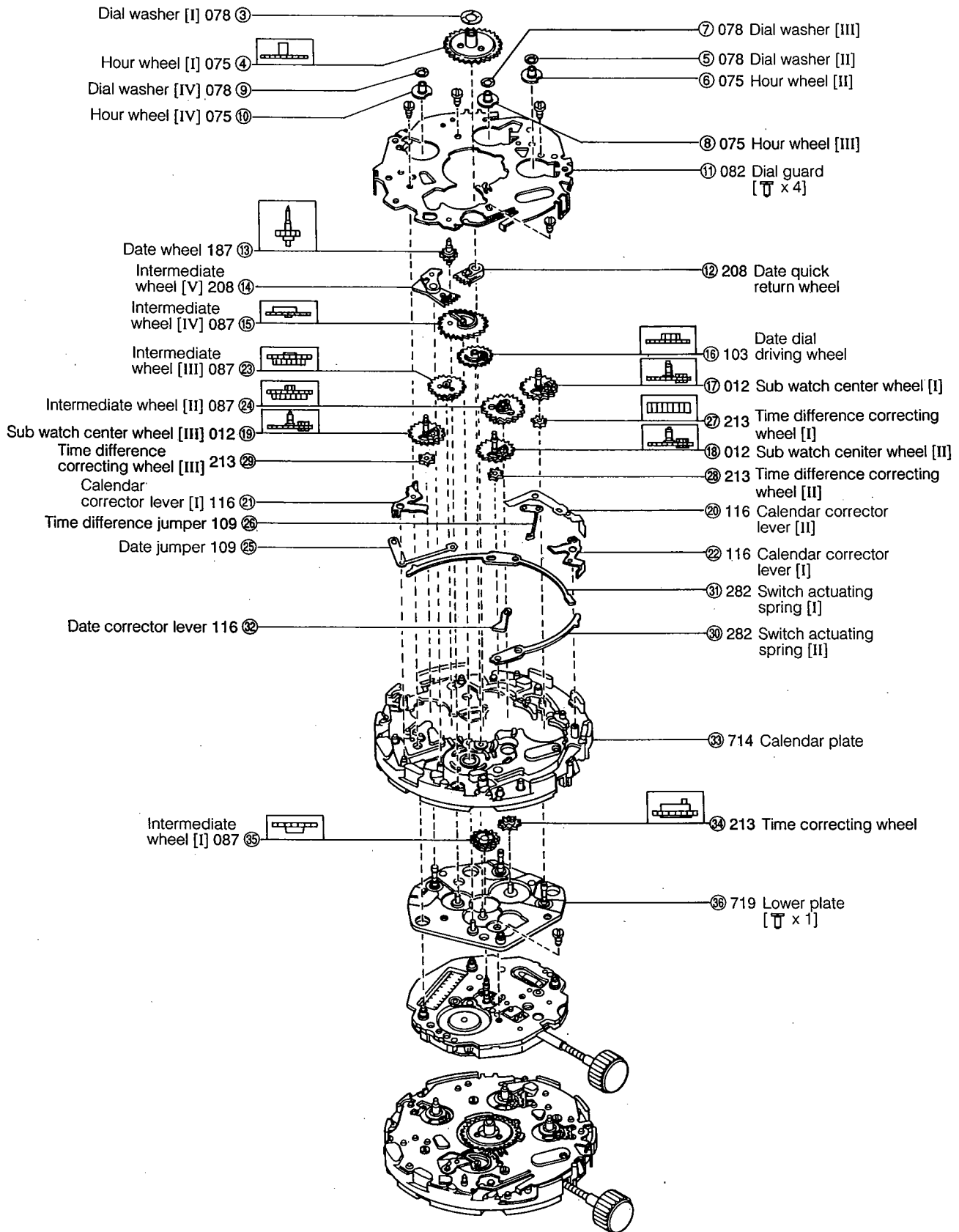
Disassembling procedure: ① → ⑤⑨  
 Assembling procedure: ⑤⑨ → ①

- Lubrication marks
- Ⓐ : A-Lube oil
  - Ⓥ : V-Lube oil
  - Ⓔ : F-Lube oil
  - Ⓞ : CH-1 oil



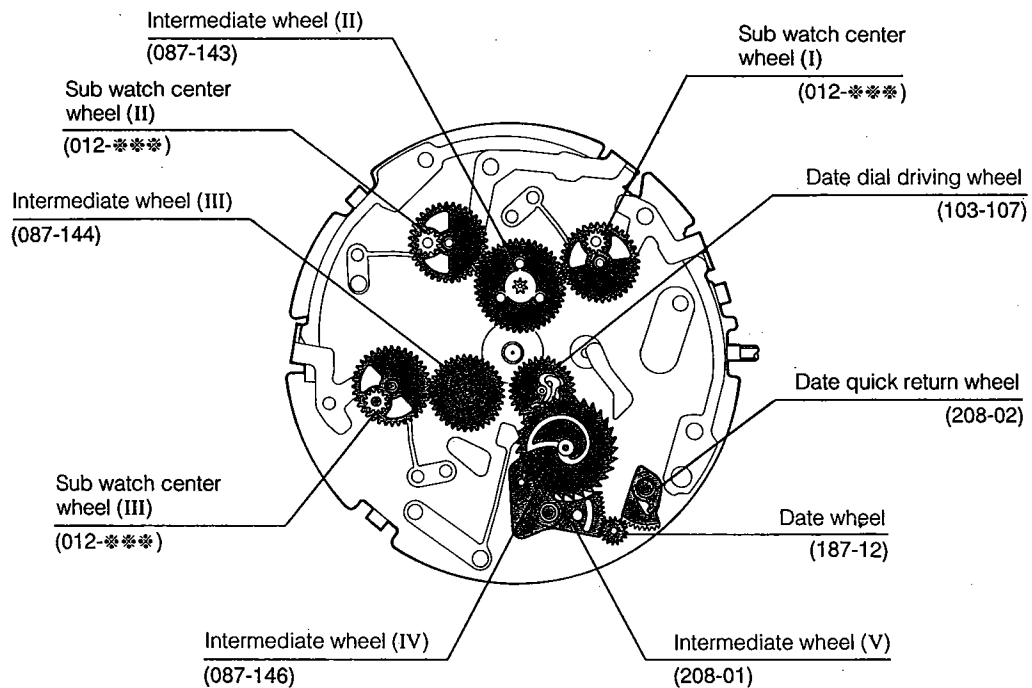
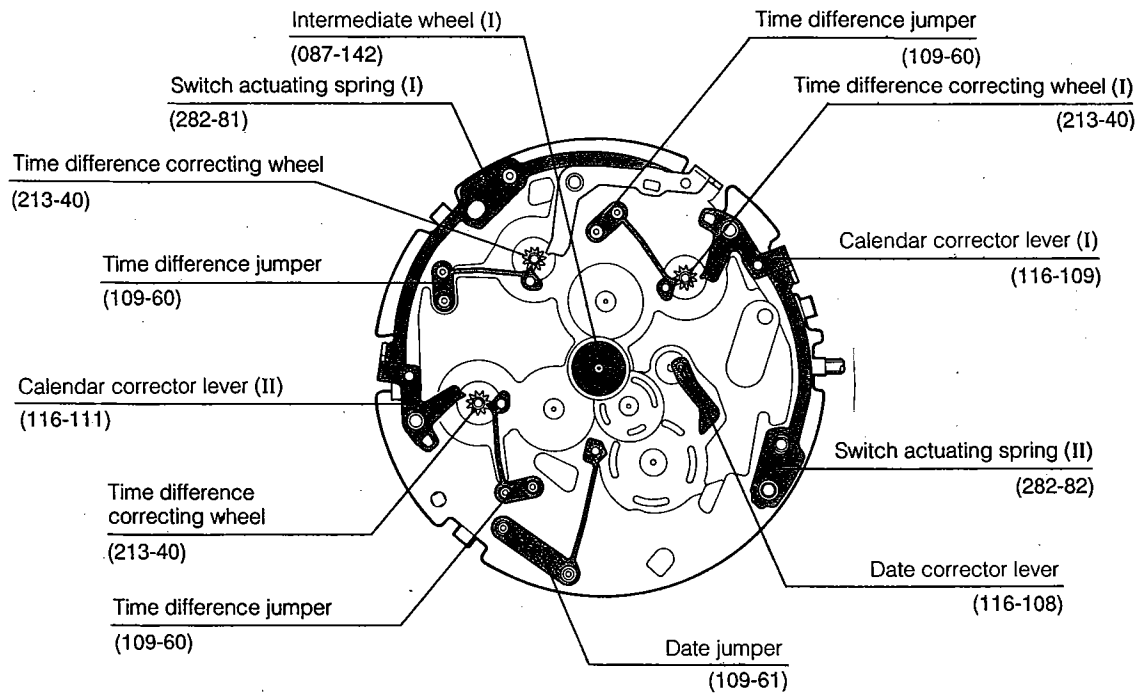
\* These parts are disassembled/ assembled on dial side.

\* Also supply V lubricating oil to the center pipe of the center wheel cock and to the minute pinion driving part of the cannon pinion with driving.





## §5. ARRANGEMENT OF SPRINGS, LEVERS, AND TRAIN WHEEL ON DIAL SIDE



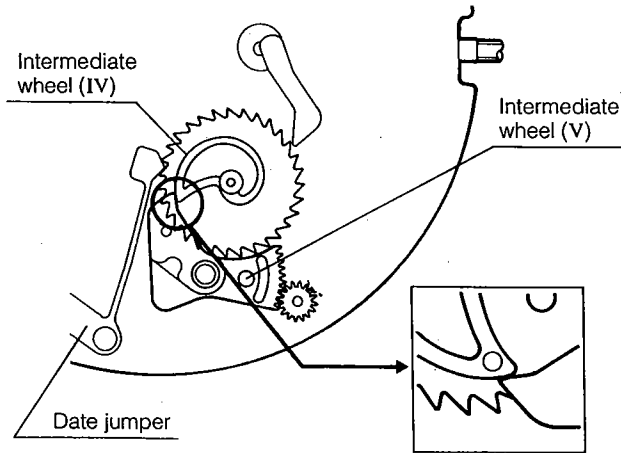
• 012-\*\*\*.....012-211 in Cal. 3100  
012-212 in Cal. 3110

## §6. PRECAUTIONS FOR ASSEMBLING THE MODULE

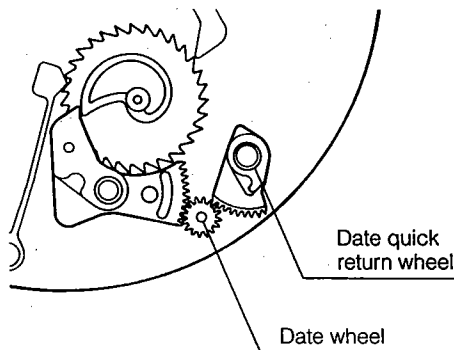
The date is indicated in this watch with the date hand on the fan-shaped scale having the divisions from the 1st to the 31st.

Accordingly, a cam is used to return the date hand from the end of each month to the first day of the next month.

Since the hand must be positioned on the module, the train wheel for the calendar must be set correctly.

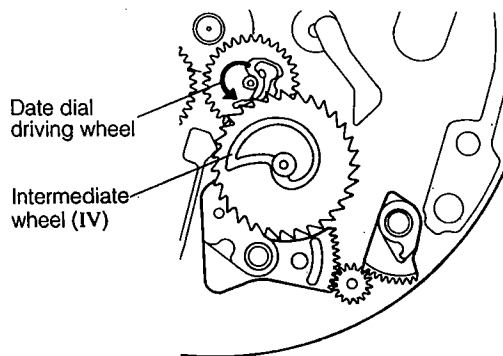


When the claw tip is set to the center of the round mark of the cam, the hand is set to the 31th position.



1. Install the intermediate wheel (IV) so that its cam and date jumper will be set as shown in left figure.
2. Hitch the date jumper to a tooth of the intermediate wheel (IV).
3. Install the claw of the intermediate wheel (V) and the cam of the intermediate wheel (IV) (so that the date hand will indicate the 31st) as shown in left figure.
  - \* The claw and cam may be positioned by turning the intermediate wheel (IV).
4. Install the date wheel.
5. With the claw of the intermediate wheel (V) in contact with the cam of the intermediate wheel (IV), install the date quick return wheel along the outside wall of the calendar plate.
6. Assemble the parts up to the calendar plate.
7. Pull out the crown to the first click and turn it to confirm that the cam and claw operate smoothly. Set the cam and claw again as shown in left figure.

## §7. HANDS SETTING METHOD



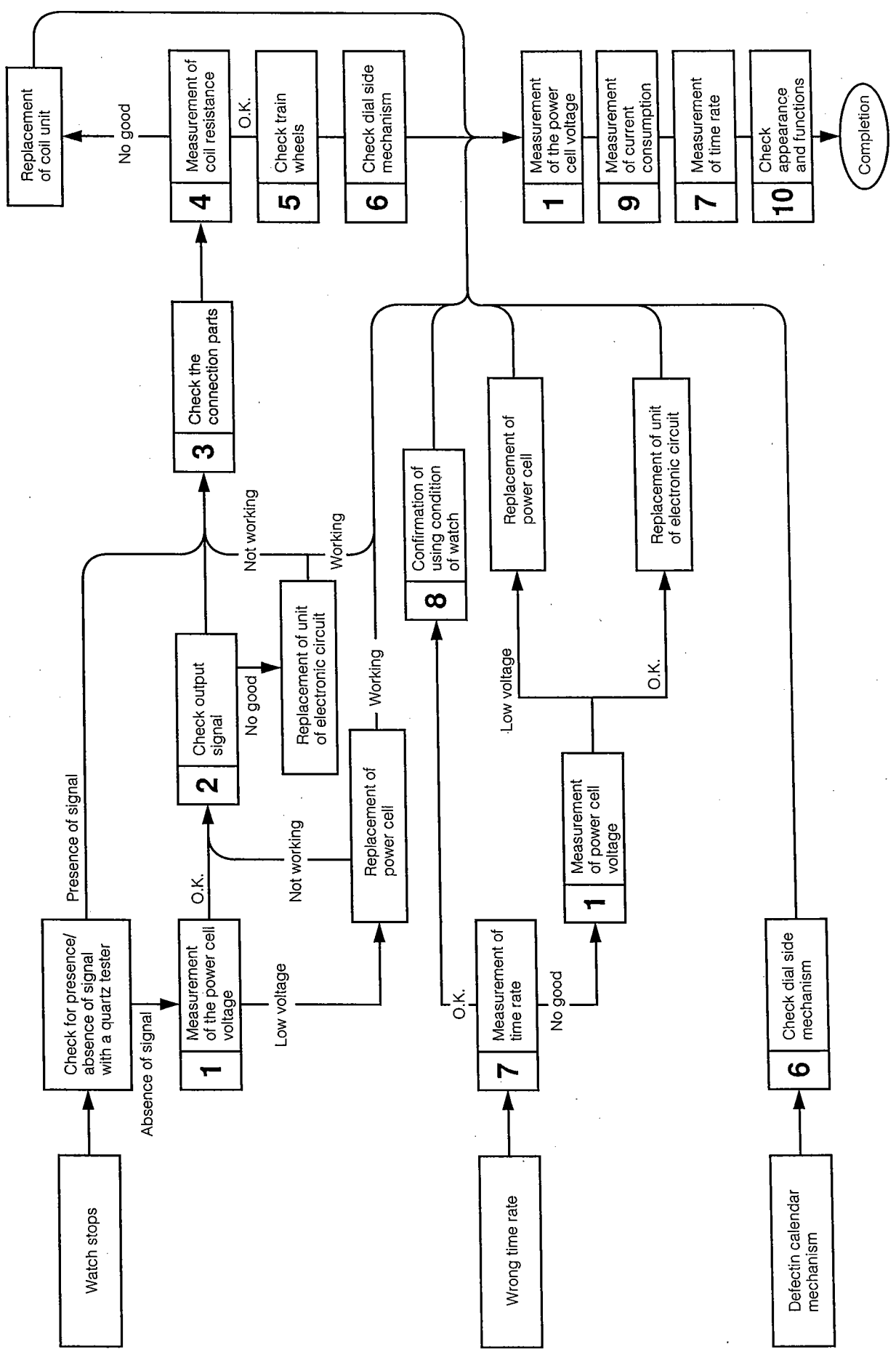
1. Pull out the crown to position (2).
2. Position the date finger of the date dial driving wheel.

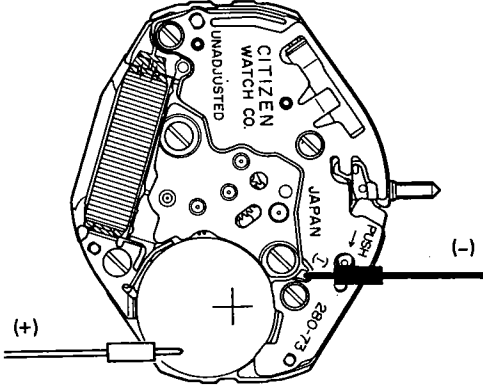
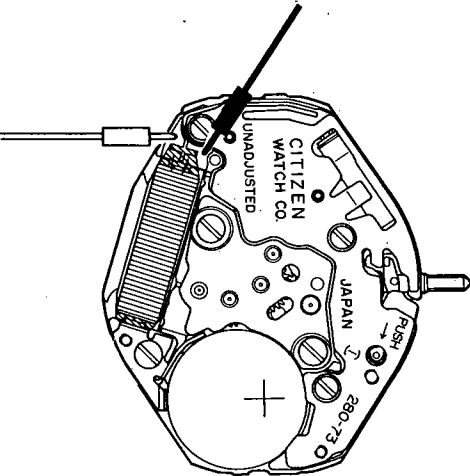
Before installing the hour wheel, set the date finger of the date dial driving wheel to a tooth of the intermediate wheel (IV).

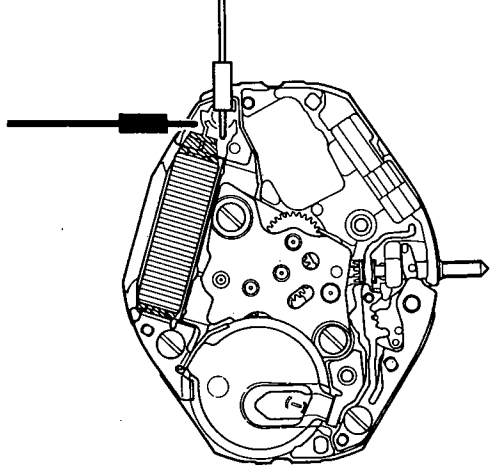
※ The hour and minute hands must be installed just after the date is changed so that the date will be changed easily by turning the crown.

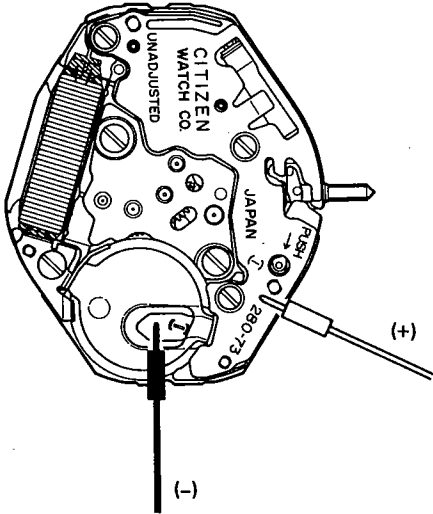
3. Set the hour wheel, dial washer and dial.
4. Set the date hand to the 31th position.
5. Slowly turn the crown to advance the date hand, and stop just after the latter has changed.
6. Set the hour hands (minute hands) of the sub-watches.
7. Set the hour, minute and second hands of the main watch.

# §8. TROUBLESHOOTING AND ADJUSTMENT



Check Items	Check Method	Results and Repair Procedure
<p>① Measurement of the power cell voltage</p>	<p>[Refer to Technical Manual, Basic Course II-1-a for the setting procedure of the tester]</p> <p>&lt;Tester range: D.C. 3V&gt;</p> 	<p><b>Over 1.5 V</b> → Non-defective</p> <p><b>Under 1.5 V</b> → Replace the power cell</p>
<p>② Check output signal</p>	<p>[Refer to Technical Manual, Basic Course II-1-b for the setting procedure of the tester]</p> <p>&lt;Tester range: D.C. 0.3V&gt;</p> 	<p>The tester pointer swings every second → Non-defective</p> <p>The tester pointer does not swing → Check the connection part</p> <p>The connections are normal → Replace the electronic circuit unit</p>
<p>③ Check the connection parts</p>	<p>[Refer to Technical Manual, Basic Course II-2-a]</p> <p>Confirm that there are no loose screws, dust or stains.</p> <p>a) If a screw in the electronic circuit unit is loose, the driving signals may not be transmitted.</p> <p>b) Dust or stains on the coil or electronic circuit unit may impair the functioning of the circuit.</p>	

Check Items	Check Method	Results and Repair Procedure
<p>④ Measurement of coil resistance</p>	<p>[Refer to Technical Manual, Basic Course II-1-c for the tester]</p> <ul style="list-style-type: none"> <li>Remove the electronic circuit unit when measuring resistance.</li> </ul> <p>&lt;Tester range: R x 10Ω&gt;</p> 	<p><b>1.8kΩ ~ 2.5kΩ</b> → Non-defective</p> <p><b>Outside range of 1.8kΩ ~ 2.5kΩ</b> → Replace the coil unit</p>
<p>⑤ Check train wheels</p>	<p>[Refer to Technical Manual, Basic Course II-2-b]</p> <ul style="list-style-type: none"> <li>Check the pinions and rotors for dust.</li> </ul>	
<p>⑥ Check dial-side mechanism</p>	<p>[Refer to Technical Manual, Basic Course II-2-c]</p> <ul style="list-style-type: none"> <li>Confirm that the Date dial driving wheel, Intermediate wheel (IV), Intermediate wheel (V), Date wheel and date quick return wheel are installed correctly. Check the parts for damage and deformation.</li> </ul>	
<p>⑦ Measurement of time rate</p>	<p>[Refer to Technical Manual, Basic Course II-2-d]</p>	<p>The watch loses or gains substantial time → Replace the electronic circuit unit</p>
<p>⑧ Confirmation of using condition of watch</p>	<p>[Refer to Technical Manual, Basic Course II-2-e]</p>	

Check Items	Check Method	Results and Repair Procedure
<p>⑨ Measurement of current consumption</p>	<p>[Refer to Technical Manual, Basic Course II-1-f for the setting procedure of the tester]</p> <p>&lt;Tester range: D.C. 12<math>\mu</math>A&gt; Set the power cell in the adapter.</p>  <p>a) This watch has a load-compensating circuit. Since this circuit adjusts the driving output of the rotor, it operates for several seconds when the power cell is mounted, and may temporarily increase current consumption. In this case, wait until the tester pointer stops fluctuating and then remeasure the current consumption.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Influence of light</b></p> <p><b>Avoid taking measurements under an incandescent lamp or direct sunshine, because this may cause the current value to increase. The light of a fluorescent lamp has no influence on current consumption.</b></p> </div>	<ul style="list-style-type: none"> <li>• Current value of the module <b>Under 1.0<math>\mu</math>A</b> → Non-defective</li>   <li>• <b>Over 1.0<math>\mu</math>A</b> → Measure the electronic circuit unit separately</li>    <li>• Measurement of the separate electronic circuit unit <b>Under 0.4<math>\mu</math>A</b> → Non-defective</li>   <li>• <b>Over 0.4<math>\mu</math>A</b> → Replace the electronic circuit unit</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>When the current value of the module is high, but that of the separate electronic circuit unit is normal. → The problem is somewhere outside the circuit. Therefore, inspect the watch for stains, lubrication conditions and deformations of parts, and remove the cause of the high load.</p> </div>
<p>⑩ Check appearance and functions</p>	<p>[Refer to Technical Manual, Basic Course II-2-f]</p>	