

SEIKO

QUARTZ

Cal. 1320A

PARTS LIST

Cal. 1320A



125 130



☆221 133



231 130



241 130



261 130



☆271 133



351 130



351 131



387 130



400 130



491 130



493 130



735 130



4001 130



4002 130



4146 130



4219 130



4239 130



4270 130



4271 130



4299 132



4303 130



4408 131



4446 140



011 541



011 550



011 552



☆SEIKO SB-DG



012 155



012 465



012 466



017 161



017 162



017 163



017 164



017 165



017 166



017 872



017 873

2/1

Cal. 1320A

Characteristics

Casing diameter : 17.1 mm × 8.4 mm
 Maximum height : 2.8 mm without battery
 Jewels : 6j
 Frequency of quartz crystal oscillator : 32,768 Hz (Hz = Hertz Cycles per second)
 Driving system : Step motor system (2 poles)
 Regulation system : Trimmer condenser
 Hand setting system : Automatic electronic-hand-setting by crown (turning the crown clockwise or counter clockwise)

| PART NO. | PART NAME | PART NO. | PART NAME |
|------------------|--|------------------|----------------------------------|
| 125 130 | Train wheel bridge | 012 466 | Circuit block screw |
| ☆221 130 | Center wheel & pinion (1.82 mm) | 017 161 | Tube for train wheel bridge (A) |
| ☆221 131 | Center wheel & pinion (1.92 mm) | 017 162 | Tube for train wheel bridge (B) |
| ☆221 132 | Center wheel & pinion (2.22 mm) | 017 163 | Tube for circuit block (A) |
| ☆ 221 133 | Center wheel & pinion (2.32 mm) | 017 164 | Tube for circuit block (B) |
| ☆221 134 | Center wheel & pinion (2.70 mm) | 017 165 | Tube for circuit block screw (A) |
| 231 130 | Third wheel & pinion | 017 166 | Tube for circuit block screw (B) |
| 241 130 | Fourth wheel & pinion | 017 872 | Axle for center wheel |
| 261 130 | Minute wheel | 017 873 | Axle for minute wheel |
| ☆271 130 | Hour wheel (0.87 mm) | ☆SEIKO SB-DG } | Silver peroxide battery |
| ☆271 131 | Hour wheel (0.97 mm) | ☆SEIKO TR621SW } | |
| ☆271 132 | Hour wheel (1.27 mm) | | |
| ☆ 271 133 | Hour wheel (1.37 mm) | | |
| ☆271 134 | Hour wheel (1.75 mm) | | |
| 351 130 | Winding stem (8.49 mm) | | |
| 351 131 | Winding stem (9.96 mm) | | |
| 387 130 | Minute wheel bridge with switch cam spring | | |
| 400 130 | Lever for unlocking stem | | |
| 491 130 | Dial washer | | |
| 493 130 | Hour wheel ring | | |
| | (Thickness 0.03 mm, gold, | | |
| 493 131 | Hour wheel ring | | |
| | (Thickness 0.05 mm, silver) | | |
| 493 132 | Hour wheel ring | | |
| | (Thickness 0.07 mm, gold) | | |
| 735 130 | Winding stem holder | | |
| 4001 130 | Circuit block | | |
| 4002 130 | Coil block | | |
| 4146 130 | Step rotor | | |
| 4219 130 | Battery connection insulator | | |
| 4239 130 | Rotor stator | | |
| 4270 130 | Battery connection (-) | | |
| 4271 130 | Battery connection (+) | | |
| 4299 132 | Dial lower plate | | |
| 4303 130 | Switch block | | |
| 4408 131 | Insulating spacer for circuit block | | |
| 4446 140 | Crystal unit cushion | | |
| 011 541 | Lower hole jewel for step rotor | | |
| 011 550 | Lower hole jewel for third wheel | | |
| 011 550 | Lower hole jewel for fourth wheel | | |
| 011 552 | Upper hole jewel for step rotor | | |
| 011 552 | Upper hole jewel for third wheel | | |
| 011 552 | Upper hole jewel for fourth wheel | | |
| 012 155 | Dial screw | | |
| 012 465 | Train wheel bridge screw | | |
| 012 465 | Minute wheel bridge screw | | |

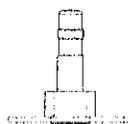
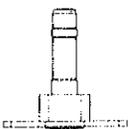
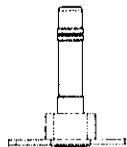
☆ ⇨ Please see remarks on the reverse page.
 Part numbers in light letters are not shown in photos.

Cal. 1320A

Remarks :

Center wheel & pinion and Hour wheel.
There are five different types as specified below.

Combination :

| Type | a | b | c | d | e |
|-----------------------|---|---|---|--|---|
| Center wheel & pinion |  |  |  |  |  |
| | ☆221 130 | ☆221 131 | ☆221 132 | ☆221 133 | ☆221 134 |
| Hour wheel | Gold  | Silver  | Gold  | Silver  | Silver  |
| | ☆271 130 | ☆271 131 | ☆271 132 | ☆271 133 | ☆271 134 |

Battery

☆SEIKO TR621SW } The applied battery for this calibre might be added the substitutive in the future.
 ☆SEIKO SB-DG } In that case, please refer to separate "BATTERIES FOR SEIKO QUARTZ WATCHES".

TECHNICAL GUIDE

SEIKO
QUARTZ

CAL. 1320A



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I. SPECIFICATIONS AND FEATURES

1. Specifications

| Item | Cal. No. | 1320A |
|-------------------------------|----------|--|
| Time indication | | 2-hand time indication (hour & minute) |
| Additional mechanism | | Automatic electronic-handsetting by crown (turning the crown clockwise or counterclockwise) Hour setting |
| Crystal oscillator | | 32,768 Hz (Hz = Hertz Cycles per second) |
| Loss/gain | | Loss/gain at normal temperature range Mean monthly rate: less than 15 seconds (Annual rate: less than 3 minutes) |
| Casing diameter | | 17.1 mm (between 6 o'clock and 12 o'clock sides) |
| Height | | 2.8 mm without battery |
| Operational temperature range | | -10°C ~ +60°C (14°F ~ 140°F) |
| Driving system | | Step motor system (2 poles: steps once every 10 seconds) |
| Regulation system | | Trimmer condenser |
| Battery power | | Silver peroxide battery (SEIKO TR 621 SW or SB-DG) Battery life is approximately 3 years. Voltage: 1.55 V |
| Jewels | | 6 jewels |

2. Features

- Cal. 1320A is a thin and compact dress type analogue quartz watch for ladies, which has been produced through the technology of miniaturization.
- Newly employed in Cal. 1320A the automatic electronic-handsetting by crown (turning the crown clockwise or counterclockwise) and the hour setting, and it allows both to set the hour hand roughly clockwise or counterclockwise by the instant time setting with the crown and to set the minute hand finely.

Movement



Dial side



Circuit side

3. How to set the time

Cal. 1320A is adopting the new automatic electronic-handsetting unlike the existing analogue quartz watches. Read carefully the following instructions to set the time.

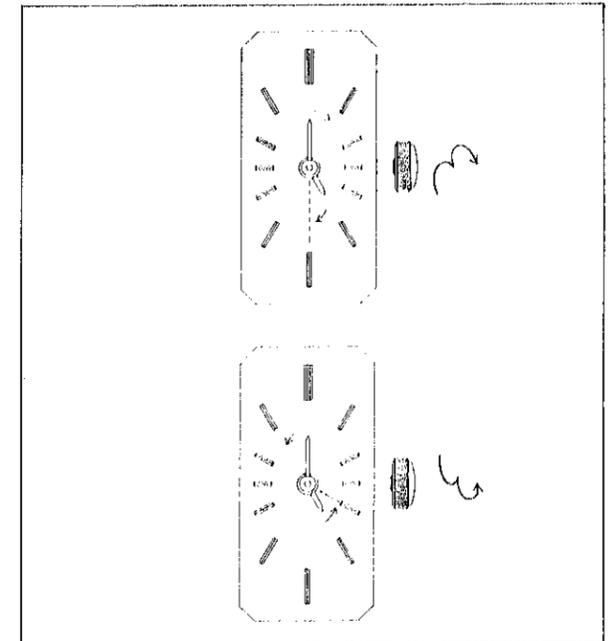
(1) Crown positions

Normal position: Free
First click position : Hand setting

(2) Setting the time

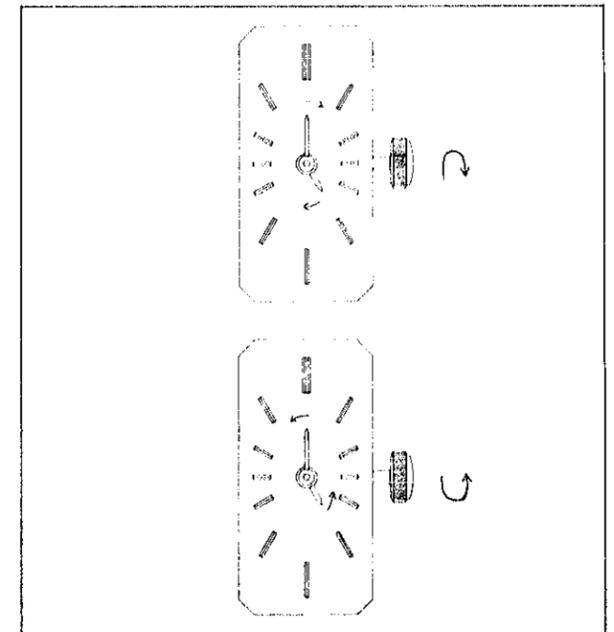
Setting the hour hand (hour setting/rough setting)

- 1 Pull the crown out to the first click.
- 2 Turn the crown two clicks clockwise at a time within 1/2 second to turn the minute hand one turn and the hour hand advances one hour.
- 3 Turn the crown counterclockwise in the same manner, and the minute hand turns just one turn counterclockwise and the hour hand goes back one hour. (When one hour or more is to be set, repeat the above operations.)
- 4 When one click is added clockwise or counterclockwise while the hour and minute hands are turned, the hands can be stopped. However, the hand cannot be stopped for one second after the time setting starts, even if the crown is turned.



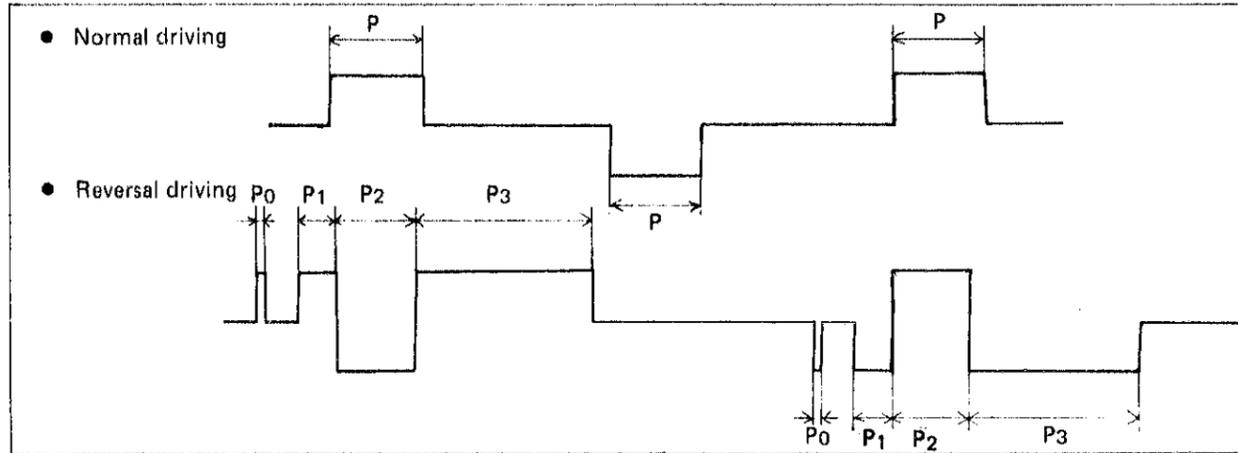
Setting the minute hand (fine setting)

- 1 Pull the crown out to the first click.
 - 2 Turn the crown one click clockwise, and the minute hand advances 30 seconds. (↻)
 - 3 Turn the crown one click counterclockwise, and the minute hand goes back 30 seconds. (↺)
(However, care should be taken not to turn the crown too quickly as the hands will automatically move one hour as in "setting the hour hand".)
- After the time is set, push the crown to the normal position.



(3) Operational principle (the principle of the reversal of the step motor)

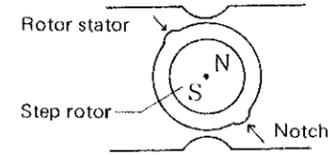
- In Cal. 1320A, the pulses for reversal driving as shown below are given to the step rotor to turn it reversely in addition to those for normal driving.



1 Step rotor at a standstill

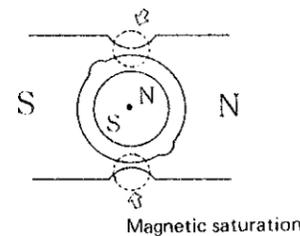
- When the current is not flowing in the rotor stator, the poles N and S of the step rotor stand still at a position inclined at approximately 40° to 50° from the plane.

Where they become stationary depends on the notch provided on the rotor stator.



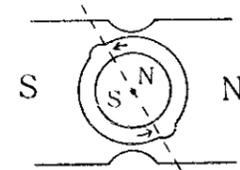
2 Driving pulse P0

- The pulse P0 simply makes the smallest width part of the rotor stator (marked with a dashed circle) magnetic-saturated. As the reversal driving pulses always flow repeatedly as P0 → P1 → P2 → P3 → P0, the pulse P0 removes the residual magnetism in the rotor stator by the pulse P3 transmitted before and the next pulse P1 plays the facilitator of the rotation of the step rotor.



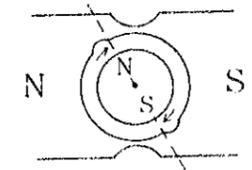
3 Driving pulse P1

- Next the pulse P1 with the longer pulse width than that of the pulse P0, which has the same polarity as the pulse P0, flows in the step rotor and it is turned until the poles N and S come near the notch of the rotor stator. This means that the step rotor is turned beforehand a little to make it easy to turn reversely by its reaction.



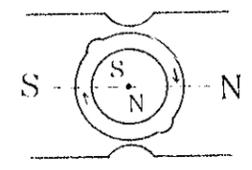
4 Driving pulse P2

- The next moment the pulse P2 with the reverse polarity to the pulse P1 flows in the step rotor, which causes it to start turning reversely.



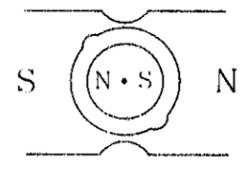
5 Driving pulse P3

- When the poles N and S of the step rotor cross the horizontal axis of the rotor stator and the pulse P3 with the reverse polarity to the pulse P2 flows in the step rotor, it further turns reversely. Because the pulse width of the pulse P3 is long enough, each of the poles N and S of the step rotor and the rotor stator turns to a position where they completely attract each other at the S-N and the N-S.



6 Shut off the driving pulse P3

- When the pulse P3 is then shut off, the step rotor comes to a standstill. This means that it has turned reversely by 180° (i.e., 10 seconds).

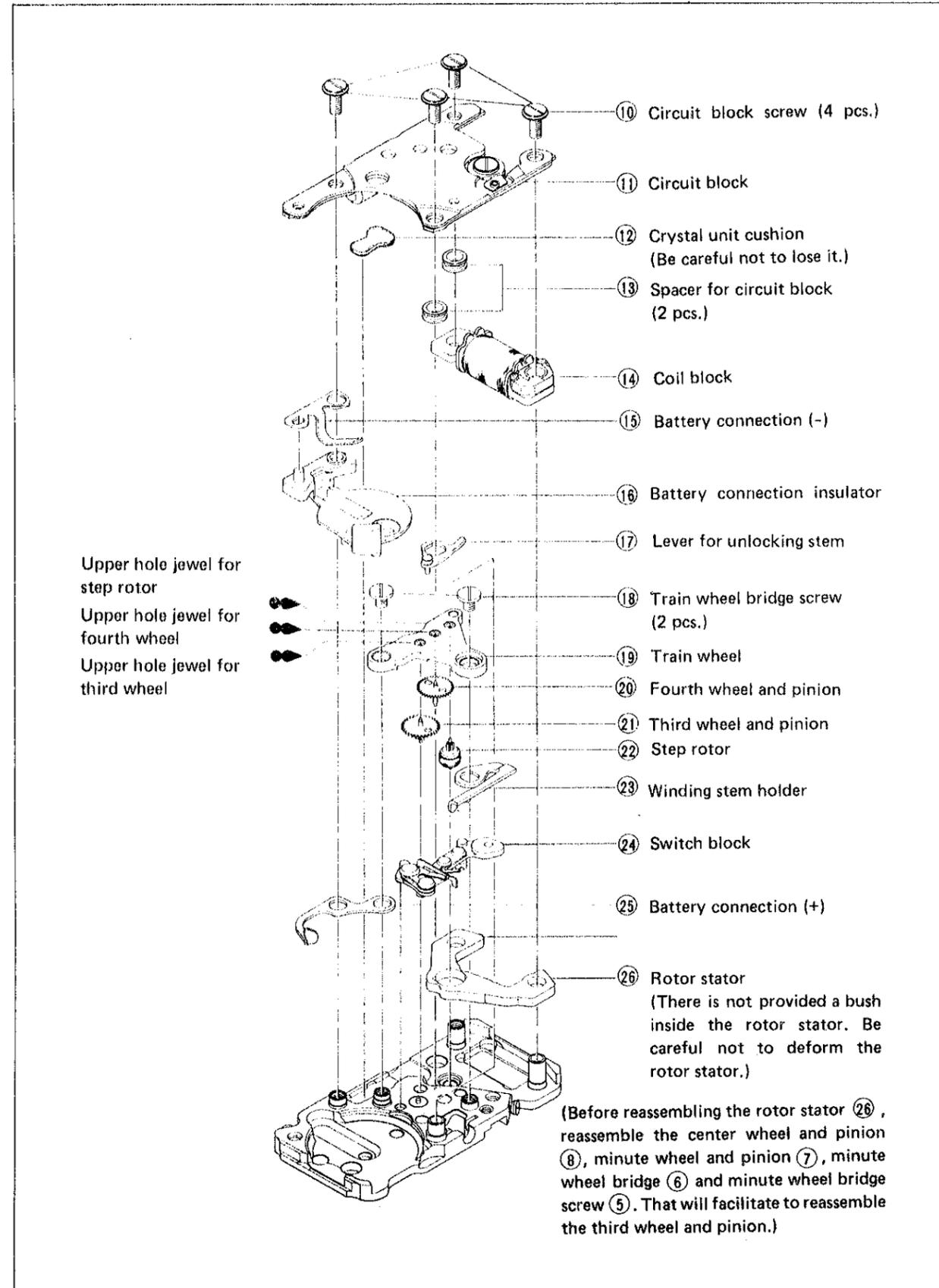


The step rotor returns to a standstill.

On the operational principle described above:

- In the fine adjusting by the minute hand, the pulse for normal driving is transmitted twice to prevent the backlash of the gear train after the five consecutive pulses for reversal driving are given and the minute hand goes back 30 seconds at every one click turning of the crown.
- In the same manner as in the fine adjusting by the minute hand, the hour hand goes back one hour at a time through the sequential transmission of the pulse for reversal driving. (In setting the time the hour hand turns at half the speed of the normal rotation.)
- How to set the time by the normal turning of the step rotor
 - In the fine adjusting by the minute hand, the pulse for normal driving is transmitted three times and the minute hand advances 30 seconds at every one click turning of the crown.
 - In the same manner as in the fine adjusting by the minute hand, the hour hand advances one hour at a time through the sequential transmission of the pulse for normal driving.

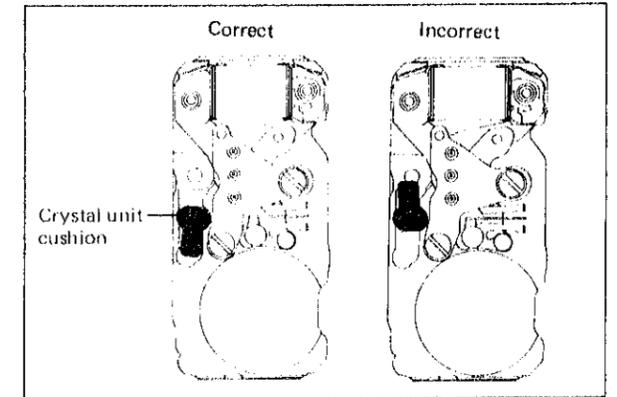
(2) Electronic circuit and gear train mechanism



Remarks for disassembling and reassembling

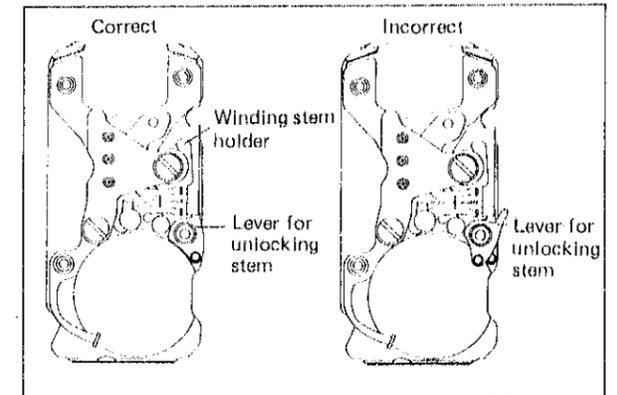
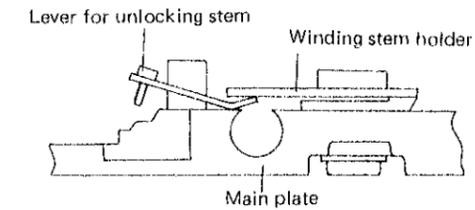
12 Crystal unit cushion

- Set the crystal unit cushion to the main plate as shown in the illustration on the right while being sure of how it is set.



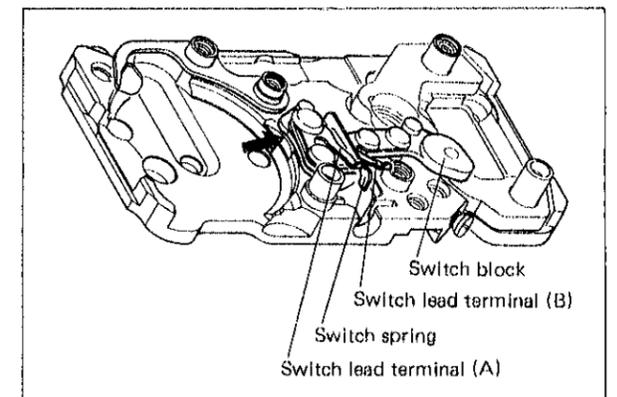
17 Lever for unlocking stem

- Set the tip of the lever for unlocking stem under the winding stem holder 23 as shown in the illustration below. When it is reassembled out of position, the battery and the case ring cannot be set in place.

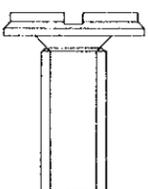
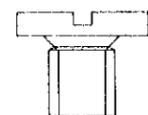
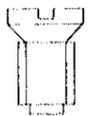


24 Switch block

- Put the tips of tweezers into the notch (arrow-marked in the illustration on the right) of the groove portion of the main plate and disassemble the switch block. Be careful not to hold the switch spring and the switch lead terminals (A) and (B) with the tweezers.

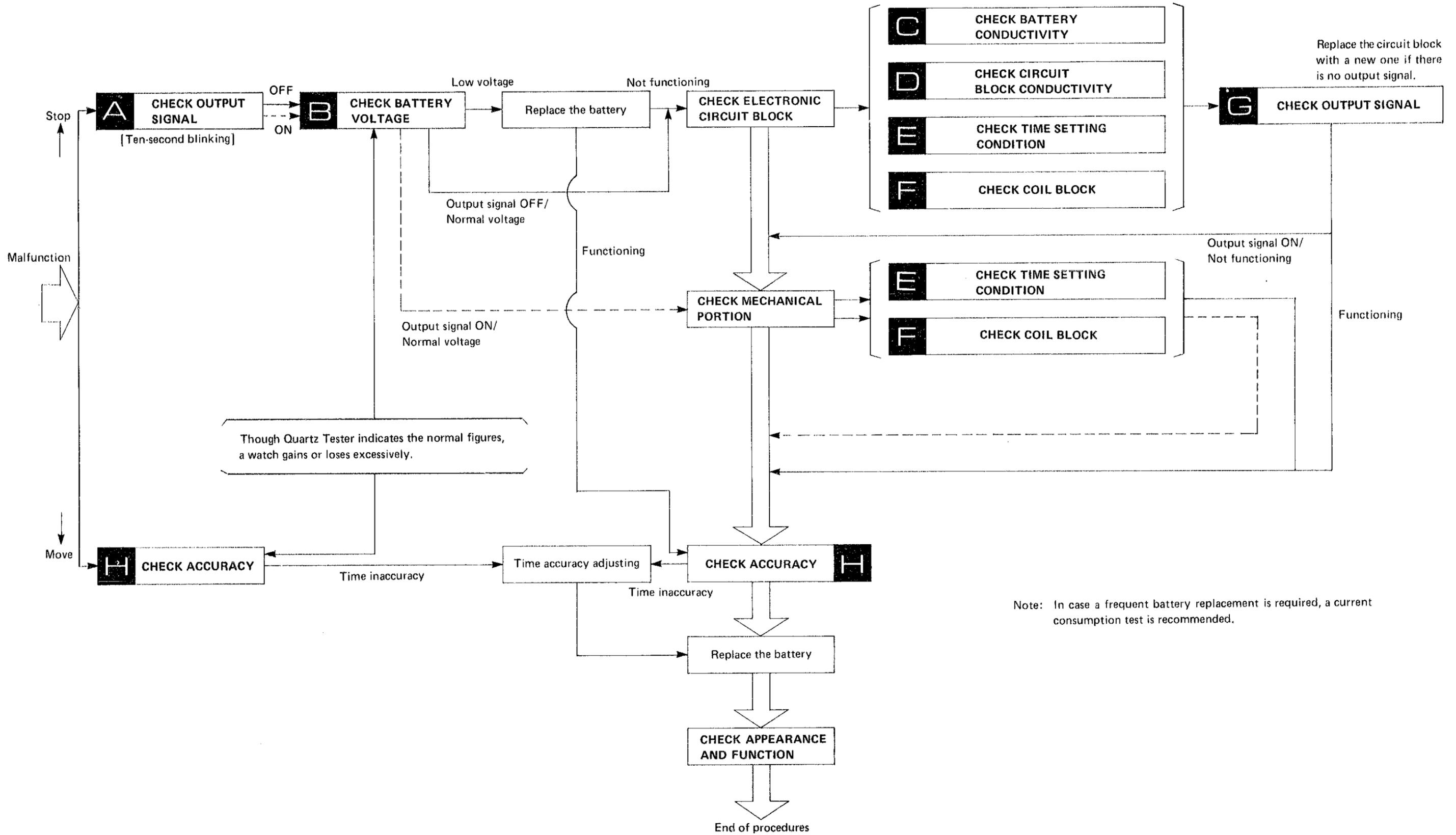


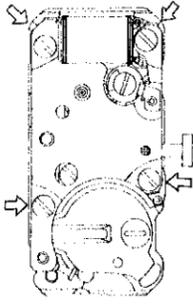
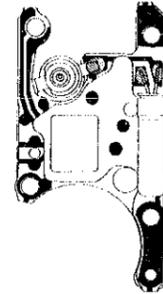
List of screws used

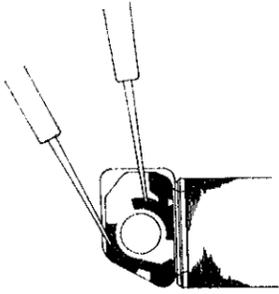
| | | |
|---|---|---|
|  |  |  |
| Circuit block screw | Train wheel bridge screw | Dial screw |
| 4 pcs. | 4 pcs. | 2 pcs. |

III. CHECKING AND ADJUSTMENT

1. Guide table for checking and adjustment



| | Procedures | Result | Adjustment and Repair | | | | |
|----------------------------------|---|--|--|---------------|------------------------|---|---|
| CHECK CIRCUIT BLOCK CONDUCTIVITY | <p>D</p> <p>Check circuit block conductivity.</p> <ol style="list-style-type: none"> 1. Check to see if the circuit block screws (4 pcs.) are tightened firmly.  <ol style="list-style-type: none"> 2. Check the circuit block for any break in the welded portion, short circuit and contamination.  | <p>No loosened screw ————— Normal —————></p> <p>Loosened screw ————— Defective —————></p> <p>No defective conductivity ————— Normal —————></p> <p>Defective conductivity ————— Defective —————></p> | <p>Proceed to D₂.</p> <p>Retighten the screw.</p> <p>Proceed to E.</p> <p>Wipe off any foreign matter.</p> <p>When there is found other defective conductivity, proceed to Replace the circuit block.</p> | | | | |
| CHECK TIME SETTING CONDITION | <p>F</p> <p>Check to see if the gear train functions correctly by operating the crown.</p> <ul style="list-style-type: none"> • Supply the current for the movement (with dial and hands). (Use the Current Supplier S-833. Apply the IC clips to the movement as follows: <table border="0" data-bbox="252 1102 682 1165"> <tr> <td>IC Clip Red</td> <td>Winding stem</td> </tr> <tr> <td>IC Clip Black</td> <td>Battery connection (-)</td> </tr> </table> <ul style="list-style-type: none"> • Check to see if time is set correctly with the crown pulled out to the first click position. <ol style="list-style-type: none"> 1. How to set the hour hand <ol style="list-style-type: none"> (1) Turn the crown two clicks clockwise at a time within 1/2 second. (2) Turn the crown two clicks counterclockwise at a time within 1/2 second. (3) Turn the crown one click clockwise or counterclockwise while the hour and minute hands are turned. 2. How to set the minute hand <ol style="list-style-type: none"> (1) Turn the crown one click clockwise. (2) Turn the crown one click counterclockwise. <ul style="list-style-type: none"> • When the operation of the crown is defective, check the following items. <ol style="list-style-type: none"> (1) Switch block (2) Circuit block conductivity | IC Clip Red | Winding stem | IC Clip Black | Battery connection (-) | <p>The minute hand turns once clockwise and the hour hand advances one hour. ————— Normal —————></p> <p>The minute hand turns once counterclockwise and the hour hand goes back one hour. ————— Normal —————></p> <p>The hour and minute hands stop. ————— Normal —————></p> <p>Note: The hands do not stop for one second after the hour setting starts, even if the crown is turned.</p> <p>The minute hand advances 30 seconds clockwise. ————— Normal —————></p> <p>The minute hand goes back 30 seconds counterclockwise. ————— Normal —————></p> <p>Switch lead terminals (A), (B) and switch spring are bent and contaminated. The crown does not click normally. ————— Defective —————></p> <p>Loosened screw and poor conductivity. ————— Defective —————></p> | <p>Proceed to F₁. (2).</p> <p>Proceed to F₁. (3).</p> <p>Proceed to F₂. (1).</p> <p>Proceed to E₂. (2).</p> <p>Proceed to F.</p> <p>If it is impossible to repair, replace the switch block. Rinse contamination with benzine.</p> <p>Retighten the screw. Wipe off any foreign matter.</p> |
| IC Clip Red | Winding stem | | | | | | |
| IC Clip Black | Battery connection (-) | | | | | | |

| | Procedures |
|---|--|
| <p>II</p> <p>CHECK COIL BLOCK</p> <p>Check for broken coil wire and short circuit of the coil block.</p> <ol style="list-style-type: none"> 1. Set up the Volt-ohm-meter. Range to be used: OHMS R x 100 2. Checking Apply the red and black probes of the Volt-ohm-meter to the two coil lead terminals.  | <p>Check output signal.</p> <ol style="list-style-type: none"> 1. Set up the Quartz Tester. 2. Checking Follow the same procedures as in A. |
| <p>I</p> <p>CHECK OUTPUT SIGNAL</p> <p>Check gain and loss of time.</p> <ol style="list-style-type: none"> 1. Set up the Quartz Tester. Be sure to set the measuring time selection switch at "10 sec." <p>When the QT-100 is used, follow the measuring method, (1) or (2). (It is impossible to measure time accuracy by any other method than the specified when the QT-100 is used.)</p> <ol style="list-style-type: none"> (1) Measure with the QT-Adapter connected. Be sure to set the measuring time selection switch at (60"). (2) Measure by using the ultrasonic microphone US-32. Be sure to set the measuring time selection switch at (0.1) and measure time accuracy five times running. Take an average of five measurements. This watch is not provided with the reset mechanism which picks up periodically the signals transmitted from the step rotor when it turns. Therefore, the gain and loss of time indicated by the US-32 may occasionally be incorrect. | <p>I</p> <p>CHECK ACCURACY</p> |

| Result | Adjustment and Repair |
|---|--|
| <p>1.4 kΩ ~ 3.4 kΩ ————— Normal —————></p> <p>Less than 1.4 KΩ (Short circuit) ———></p> <p>More than 3.4 kΩ (Broken coil wire) ———></p> <p>Defective —————></p> | <p>Proceed to G.</p> <p>Replace the coil block.</p> |
| <p>Ten-second blinking ———></p> <p>Functioning — Normal —————></p> <p>Not functioning — Defective —————></p> <p>No ten-second blinking ————— Defective —————></p> | <p>Proceed to H.</p> <p>Proceed to CHECK MECHANICAL PORTION.</p> <p>Replace the circuit block.</p> |
| <p>————— Normal —————></p> <p>————— Defective —————></p> | <p>Replace the battery with a new one.</p> <p>Proceed to Time accuracy adjusting.</p> |

In case a frequent battery change is required, a current consumption test is recommended. Use the following procedures.

1. Set up the Volt-ohm-meter.

- Range to be used: DC $12\mu\text{A}$ (DC 0.03mA)

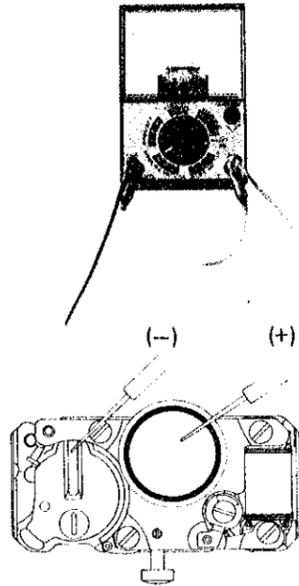
2. Set up the condenser of $200 \sim 500\mu\text{F}$ as shown in the photo.

3. Measuring

- Probe Red (+) Battery connection (-)
 Probe Black (-) Battery surface (-)

4. Result

- Less than $0.6\mu\text{A}$ Normal
 More than $0.6\mu\text{A}$ Check the electronic circuit block.



Note:

- If the pointer of the Volt-ohm-meter scales out and the current consumption cannot be measured, reset its range (e.g. at DC 30mA). Next, when the pointer is stabilized, return the range to DC $12\mu\text{A}$ (DC 0.03mA) and read the value indicated with the probes of the Volt-ohm-meter applied.

Remarks for measuring the current consumption

- This watch steps at 10-second intervals.
 When measuring the current consumption, the pointer of the Volt-ohm-meter swings once every 10 seconds.
- When the probes (+) and (-) of the Volt-ohm-meter are applied as shown in the illustration above, the pointer of the Volt-ohm-meter swings slightly, indicating that the current is flowing through the IC. The pointer of the Volt-ohm-meter swings at 10-second intervals and the motor driving current flows in addition to the current running through the IC.
- Calculate the current consumption as follows:
 (Ex.) Suppose that IC current = $0.3\mu\text{A}$ and IC current + Motor driving current = $0.7\mu\text{A}$, then the current only for driving the motor is $0.4\mu\text{A}$. However, it is the value at 10-second stepping. Therefore, it is required to reduce $0.4\mu\text{A}$ to the value at 1-second stepping. Consequently, the current consumption only for the motor is $0.04\mu\text{A}$. Accordingly the current consumption for this watch is calculated as: $0.3\mu\text{A} + 0.04\mu\text{A} = 0.34\mu\text{A}$.
- Also when the Micro Test is used, calculate the current consumption just in the same manner.